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Note.—Initialled abstracts are written by the following:

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* General studies, see also individual crops

Plant Breeding Abstracts

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Part I. Empire Section

*STATISTICS 519

1004. BOYCE, S. W. 519.24:631.421:633.11
Statistical studies on New Zealand wheat trials. I. The efficiency of lattice design.
N.Z. J. Sci. Tech. 1945 : **27** : Sect. A : 270–75.
Results from 21 lattice trials with 1056 wheat strains have shown an increase in efficiency over the randomized block design ranging from 0% to 152%, the mean increase being 18%. The increased precision of the lattice design enables a more rapid elimination to be made of low-yielding lines, but does not lead to a more accurate final selection.

1005. BOYCE, S. W. 519.24:631.421:633.11
Statistical studies on New Zealand wheat trials. II. The analysis of lattice trials with incomplete data.
N.Z. J. Sci. Tech. 1945 : **27** : Sect. A : 276–80.
The relative efficiencies of three different formulae for calculating missing plot values in incomplete block data have been analysed.

1006. WILLIAMS, C. B. 519.271.3
Yule's "characteristic" and the "index of diversity".
Nature, Lond. 1946 : **157** : p. 482.
A short discussion is presented on the contributions made by Fisher, Udny Yule and the author to the theory of random sampling from mixed populations in which all the constituent groups are not equally abundant.

*BREEDING 575

1007. 575:007
Prof. F. R. Immer.
Nature, Lond. 1946 : **157** : p. 362.
A short obituary notice is given of Prof. Immer whose achievements in plant breeding and in the design of statistical methods for field experiments are briefly recounted.

1008. 575:007
Professor H. J. Muller.
Mon. Sci. News 1946 : No. 1 : 1–2.
An account is given of the genetical work of H. J. Muller.

1009. BELL, G. D. H. 575:633(42)
Crops and plant breeding.
J. R. Agric. Soc. 1945 : **106** : 1–12.
Various problems of crop production are discussed and recent work is reviewed. Reference is made to the following: the baking quality of some home-grown wheats; oat trials; the new variety of spring oats, S.200; the new winter barley, Prefect; herbage plants trials; the different reaction of potato varieties to virus diseases; and trials of mangold strains.

1010. 575:633(54)
Annual Report of the Imperial Council of Agricultural Research, New Delhi 1944–45 (1945) : Pp. 45.

Wheat

In breeding for rust resistance at Simla, the work of hybridization between the most promising hill wheats and rust resistant varieties has now been completed. Hybrids are under test for resistance to black rust, resistance to brown and yellow rusts, and resistance to all three rusts. Anatomical studies carried out to correlate rust resistance with some easily determinable morphological characters were concluded.

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* General studies, see also individual crops.

At Mahabaleshwar, seedlings and adult plants are being tested for black stem rust resistance. A programme of breeding improved strains for the black soil areas is in operation in the Central Provinces. Investigations include the collection of rust samples, the testing of indigenous and introduced wheats for rust resistance, and intervarietal and interspecific hybridization.
In the Punjab, tests of the milling, baking and biochemical properties of Indian wheats are in progress, for the purpose of breeding work.

Barley
Small-scale tests of varietal resistance to black and yellow rusts were continued at Simla.

Sorghum
The development of jowar varieties resistant to *Striga lutea* and *S. densiflora* is receiving attention in Bombay.

Rice
Investigations in Kashmir have included hybridization work with Russian, Chinese and American varieties; the hybrids have ripened earlier and given heavier yields than the other varieties under observation.

Potato
Objectives of breeding work at Simla are as follows: (1) the study and classification of available Indian varieties and the use of the most promising material in crosses with other cultivated varieties or South American species; (2) the study of large collections of wild and cultivated South American potatoes; (3) the development of high-yielding, disease resistant varieties for the hills and plains of Northern India; and (4) the supply of initial seed stocks of superior hybrids for trial in the various provinces and states. The work of classification has been completed. Considerable progress in breeding for late blight resistance is also reported.

Sugar cane
At Coimbatore, investigations included the chemical composition of flowering and non-flowering varieties, the relation of photoperiod to flowering habit, and the chemical induction of flowering. A new photoperiodic treatment inducing flowering in a wild *S. spontaneum* cane from Burma was discovered. At the Imperial Agricultural Research Institute, tests of varietal resistance to red rot, wilt and smut were carried out.

Tobacco
In four years' trials at Guntur, Amarelo 5 was superior to Harrison's Special in curing properties and percentage of high grade cured leaf. A white-flowered mutant of Amarelo 5 has proved to be similar to Amarelo 5 in yield and curing properties. The value of the white flower in maintaining the purity of the strain is pointed out.

Oil plants
In the Punjab the work of improving toria and sarson (*Brassica* spp.) and taramira (*Eruca sativa*) was continued. At the Imperial Agricultural Research Institute cytogenetic studies on the *Brassica* oil crops are in progress.

Groundnut
The production of superior strains combining high yield and oil content, and resistance to drought, diseases and pests is in progress in Madras.

Pulses
Investigations on various pulse crops are being carried out at several centres, with a view to the production of high-yielding, and disease and drought resistant strains with desirable commercial qualities. In the Punjab the wilt resistance of gram varieties is being studied.

1011. 575:633(54)

Annual session of the Indian Academy of Sciences held at Udaipur.
Curr. Sci. 1946 : **15** : 7–8.

The eleventh annual meeting of the Indian Academy of Sciences, held jointly with the National Academy of Sciences in December, 1945, included a symposium on the "Role of Plant-Breeding in the Development of Indian Agriculture." It is reported that the importance of breeding for disease and drought resistance and other special qualities in addition to increased yield was emphasized. New wheats developed by S. Ranjan at Allahabad University by X-ray technique were exhibited.

1012. S....., B. G. L. 575:633(54)

Botany and human welfare.

Curr. Sci. 1946 : **15** : p. 17.

A summary is given of B. P. Pal's presidential address, delivered at Bangalore in 1946, to the Botanical Section of the Indian Science Congress. Achievements in plant breeding in India are described, and attention is drawn to methods of plant improvement which have so far received little or no attention in India.

1013. 575:633(54.1)

Annual Report of the Department of Agriculture, Bengal for the year 1940–41 (1941) : Pt. I : Pp. 33.

Annual Report of the Department of Agriculture, Bengal for the year 1940–41 (1942) : Pt. II : Pp. 548.

In addition to the investigations summarized below, Part II of the 1940–41 annual report contains detailed reports of varietal trials of wheat, cotton, sugar cane, tobacco, groundnut, linseed, pulses and other crops. Part I of the report gives a summary only of the investigations conducted during the period under review.

Rice

Selection work and varietal trials are reported at the different experimental farms and the 14 district farms.

At Dacca, seeds of the highland aus type of paddy have been treated with colchicine, and the effect upon tiller and leaf number, plant height and other characters has been investigated. Vernalization experiments in the same type of paddy are reported. Further observations have been made on hybrids involving the following varieties of transplanted Aman paddy: Dadkhani, Indrasail, Tilakkachari, King George, Jhingsail, Latisail, Dudsar and Patnai.

At the Chinsurah Rice Research Station and Gosaba Farm homozygous types showing good quality and yield have been selected from the hybrid Latisail x Blue Rose. The following hybrids are under investitation at the Suri and Bankura Farms: Kataktara x Bhasamanik, Blue Rose x Latisail, Latisail x Manikkalma, Latisail x Bhasamanik, and Bhasamanik x Manikkalma. Over 900 pure lines of aus paddy are being selected for resistance to *Helminthosporium* at Dacca.

Sugar cane

Varietal resistance to the borers *Scirpophaga nivella, S. monostigma, Argyria tumidosoctalis* and *Emmalocera depressilla,* was studied.

1014. 575:633(54.1)

Annual Report of the Department of Agriculture, Bengal for the year 1941–42 (1942) : Pt II : Pp. 26.

Investigations, chiefly on rice, are briefly reported, and consist of the continuation of work reported in detail in Part II of the annual report for 1940–41 (see Abst. 1013 above).

1015. 575:633(66.4)

Annual Report of the Department of Agriculture, Sierra Leone for the year 1944 (1945) : Pp. 15.

Investigations on new types of rice at Rokupr and on various grass species at Njala have been continued. Approximately 60 rice varieties and selections have been maintained for future breeding work; yield trials of six selected varieties and new importations from Ceylon, British Guiana and Peru are reported. Trials with new introductions of sweet potato, cassava, tobacco and beans are in progress at the different stations.

1016. 575:633(66.7)

Report on the Department of Agriculture, Gold Coast, for the year 1944–45 (1945) : Pp. 8.

In addition to the experiments reported below, mention is made of tests with rice, fodder grasses, *Urena lobata,* soya bean and *Derris elliptica.*

Cassava

The collection of varieties has been maintained. The field multiplication of 15 mosaic resistant strains of palatable cassava is reported. Cuttings of the resistant strains Queen, Garri, Williams and Ankra have been distributed.

Yam

Yield trials are reported.

Vegetables
Selection of improved types of egg plant, okra and native beans have been continued.

1017. LEWIN, C. J. 575:633(68.9)
Annual Report of the Department of Agriculture, Northern Rhodesia for the year 1944 (1945) : Pp. 12.

Wheat
Preliminary varietal trials are reported at the newly acquired farm near Lusaka; Beltista, Pioneer and Jubilee showed promise under local conditions.

Eleusine
In the Central Province ten high-yielding strains of *E. coracana* have been selected and multiplied.

Cassava
The local selection, Matutumushe (C.4) and Lyongo (P.7), have so far proved mosaic resistant in the Central Province.

1018. 575:633(69.82)
Annual Report of the Department of Agriculture, Mauritius 1944 (1945) : Pp. 30.

Maize
The improvement of local maize is reported.

Sweet potato
Varietal tests for resistance to *Colletotrichum* indicated that the varieties Raisin, Yellow and Egyptian are the most resistant.

Sugar cane
Breeding work has been continued.

Tobacco
Breeding work has been limited to selection. In the group of intervarietal crosses, two F_2 plants from the White Stem Pearl x Amarello selection show promise. The plants are superior to the Bonanza x Amarello hybrids, and have leaves similar to those of White Stem Pearl. In the F_3 progeny of plants from colchicine-treated seed, selections have been obtained from crosses involving Amarello which are superior to the Bonanza x Amarello selections in the intervarietal crosses. The most promising results have been obtained from the three F_2 back-crosses of plants from colchicine-treated seed; the variety Amarello was a parent in each of these crosses. The progenies are robust, with the slow growth habit of Amarello and large leaves. The leaves cured well and are to be tested for flavour.

Beans
The local red bean variety has proved to be more resistant to the bean fly, *Melanoagromyza phaseoli* Coq., than the dwarf varieties, Canadian Wonder, Long Tom, and the runner varieties, Everbearing and Black Local. Among these varieties Long Tom is the least susceptible.

1019. GARDINER, J. G. 575:633(71)
Report of the Minister of Agriculture for the Dominion of Canada for the year ended March 31, 1945 : Pp. 212.

Wheat
Breeding for saw fly resistance is reported. An attempt is being made to develop high-yielding rust-resistant varieties, which ripen earlier and more uniformly than present varieties. The breeding of soft white spring wheats suitable for the cake and pastry trade is in progress. The production of improved soft winter wheats for Ontario is also receiving attention. In tests at Saskatoon of a large number of new and standard varieties of *T. vulgare* and *T. durum* for resistance to common root rot, Carlton showed considerable resistance. An investigation was also made of the varietal resistance of seedlings to *Helminthosporium sativum*; Apex, Thatcher and Red Bobs were fairly resistant.

Oats
Beaver is a new stem and leaf rust resistant variety derived from a cross between Vanguard and Erban. Beaver resembles Erban in field characteristics, and ripens at approximately the same time. It gives slightly higher yields than either parent, even in the absence of rust, producing a large kernel with a slightly thinner hull than Erban. The new variety Larain has been produced for Central Alberta. Larain is strong-strawed, early ripening, high-yielding variety, bred from a

cross between Alaska and Golden Rain. The breeding programme continues to concentrate on the development of varieties, combining high yield, rust resistance, strong straw and thinness of hull. Breeding for a non-shattering variety is in progress. An attempt has also been made to combine rust resistance and the good qualities of the hull-less variety Brighton.

Maize

The new yellow, early maturing hybrids, Canbred 150 and Canbred 250, have been produced at Ottawa entirely from locally developed lines. Canbred 150 is a combination of flint and dent lines. At Harrow three new hybrids, Harvic 222, 300 and 333, have been released; these are early, medium and late maturing, respectively. Promising locally developed hybrids have been obtained in the intensive breeding programme at Morden. These hybrids are early maturing and show superiority in yield and strength of rooting over the best commercial variety Wisconsin 240.

Barley

The development of a mildew resistant variety is progressing. In breeding for rust resistance new crosses have been made with the loose smut resistant Titan as one parent. In tests at Winnipeg a few varieties have shown considerable resistance to common root rot. A large number of varieties and strains were also tested for their reaction to stem and leaf rust, net blotch, false stripe and powdery mildew. While many of the varieties and strains exhibited resistance to one of these diseases, a very small number possessed resistance to all the diseases.

Forage crops

The new lucerne variety Canauto has been released; in hay yield it equals Grimm, and in seed yield outyields all other varieties. A Canadian variety of wild white clover, named Pathfinder, has also been released; it produces 19·4% more forage than the common white Dutch clover.

Triticum x *Agropyron* hybrids are under investigation.

The breeding of two new early maturing varieties of soya bean, Capital and Harman, is reported at Ottawa and Harrow, respectively.

Root crops

Promising club root resistant selections have been obtained from swede x turnip hybrids and Danish Giant.

Potato

At the Fredericton Station seedlings have shown resistance to leaf roll. Some of these seedlings are resistant to mild mosaic and late blight, and also possess desirable commercial qualities. A large number of seedlings have been tested for blight resistance, most of them being crosses between standard varieties and *S. demissum* Lindl. and immunity or resistance was exhibited, even in the sixth back-cross generation. Tests of new and old seedlings for common scab resistance have been carried out. In the multiplication plots, 43 late blight resistant seedlings, 19 scab resistant seedlings and six mosaic resistant seedlings are considered to be particularly promising.

Flax

The breeding of varieties resistant to rust, wilt and pasmo is in progress. Lines have been obtained with resistance to wilt and immunity to the rust races; these are being crossed with other varieties showing pasmo resistance. Progress in the breeding and testing of fibre varieties is also reported.

Tobacco

At the Harrow Station studies have been made of the resistance of flue-cured, Burley and black tobacco varieties to black and brown root rot. A new selection of black tobacco, designated No. 5058, shows possibilities as a black root rot resistant variety.

Sunflower

At Saskatoon single cross F_1 hybrids have outyielded Mennonite. They mature earlier than Sunrise, and are highly uniform, strong stemmed, medium in height, and higher in oil content than any other material. A single cross between Sunrise and an inbred line of Mennonite, S–37–388, produced in natural crossing plots, gave high yields and showed considerable resistance to wilt and moderate resistance to the sunflower moth.

Rubber plants

Cytogenetical investigations of *Asclepias* are reported. The chromosome number of eight species and varieties was found to be $2n = 22$. Colchicine treatment was used in an attempt to obtain

polyploids; polyploid characteristics were easily produced, but the growth rate was extremely slow and no unquestioned polyploid resulted. Mature pods were obtained from intraspecific hybrids of *A. incarnata, A. syriaca,* and *A. curissavica.* Experiments to date indicate that *A. incarnata, A. syriaca* and *A. speciosa* are self-sterile. One plant of *A. curissavica* proved to be self-fertile.

Cytogenetic investigations were also conducted on *Taraxacum Kok-saghyz,* with a view to developing a vigorous, relatively uniform variety with high rubber content. Numerous crosses were made between parents of known rubber content. Crosses in which both parents were high in rubber content gave progenies of which 20% had a high rubber content. Crosses from parents which were both low in content produced a progeny of which only 3·5% were high in rubber. The propagation of a large number of clones of known rubber content has been continued and certain polyploid clones have been increased by both leaf and root cuttings, with a view to comparing polyploids and diploids.

Pome and stone fruits

At Summerland, apple and pear varieties have been tested for resistance to crown rot (*Phytophthora Cactorum*) and fire blight (*Erwinia amylovora*) respectively. At Ottawa the apple hybrids Melba x Yellow Transparent and Wealthy x Duchess show promise.

At Morden, seedlings of the Manchu (Nanking) cherry show improvements in comparison with the variety Drilea; selections of the Mongolian cherry are also under observation. Two Scout x McClure apricot hybrids have excelled all named varieties at the station. The new cherry variety, Van, has been released by the Summerland Station. Its fruit is distinguished by an attractive bright, lustrous skin, which renders the fruit resistant to splitting and storage rots.

Rubus

Four new hybrid raspberry seedlings with red, purple, yellow and black fruits, respectively, have been selected at Morden. Loganberry breeding for dry berry resistance has been initiated at the Saanichton Station.

Melon

Breeding for early maturing melons, better adapted to prairie conditions, is reported at Morden.

Tomato

At Lethbridge, a breeding programme to produce early maturing varieties suitable for canning or juice production is in progress. Promising selections have been developed at Morden where the bush habit is receiving attention.

Peas and beans

The new canning pea variety, Alton, is to be distributed. A new bean variety named Ace, showing promise for the maritime provinces, has also been produced.

1020. 575:633(71.3)

Seventieth Annual Report of the Ontario Agricultural College and Experimental Farm, Department of Agriculture 1944 (1945) : Pp. 97.

Wheat

A collection of winter wheats has been secured for breeding purposes. The problems arising in connexion with growing a crop in the greenhouse during winter are being studied; they include vernalization. An extensive system of regional testing has been initiated.

Barley

In preliminary progeny tests several new strains of spring barley showed a sufficiently low protein content to be of possible value as malting barleys. Other strains showed a high protein content. New crosses were made, using Chevron and various hybrid strains. An attempt is being made to find or develop a winter barley sufficiently hardy for conditions in Ontario.

Forage crops

The work of comparing improved grass and clover varieties with the commercial strains is now complete; nine improved grass and four clover varieties are being considered for registration in the near future. Breeding and selection work have been continued.

Potato

Seedlings have been received for breeding purposes which show resistance to blight, scab or mild mosaic.

Vegetables

The testing of vegetable varieties for freezing purposes has been continued, particular attention being given to squash and sweet corn.

1021. 575:633(72.9)

Annual Report of the Department of Science and Agriculture, Barbados for the year 1944–45 : Pp. 17.

In addition to the work summarized below, selection of Indian maize and investigations with the pigeon pea, *Phaseolus aureus, P. Mungo* and perennial Kavironda sorghum are reported:—

Cotton

Selection of the B.40, B.41, B.42 and B.43 series was carried out.

Sugar

Intergeneric hybridization was continued. In the select seedling trials harvested in 1945, B.41211 and B.41227 of the B.41 series showed promise of being suitable as commercial canes. Of the B.40 series, B.4098 gave high yields of cane having good juice qualities, both as plant canes and first ratoons, particularly in areas with high and intermediate rainfall. Mosaic resistance tests were continued, using the virus carried by B.2935 and B.34104.

*GENETICS 575.1

1022. Lea, D. E. and Catcheside, D. G. 575.17:575.243:537.531

The bearing of radiation experiments on the size of the gene.

J. Genet. 1945 : **47** : 41–50.

"At various times it has been proposed that the size of the gene can be estimated from experiments on the yield of mutations obtained with known doses of X-rays. The assumptions involved in calculations of this sort are discussed, and some of the objections which have been raised against them answered. It is pointed out that similar assumptions, applied to experiments on the inactivation of enzymes and viruses, lead to estimates of the sizes of these bodies correct to a factor of two in diameter. The estimate arrived at for the size of the gene in *Drosophila* is 4–8 mμ diameter. The length of the euchromatic region of the X-chromosome thread in the sperm is deduced to be 10–20 μ". [Author's summary.]

VARIATIONS, MODIFICATIONS, MUTATIONS 575.2

1023. Zamenhof, S. 575.243:581.04

Studies on induction of mutations by chemicals. II. Experiments with unstable genes.

J. Genet. 1945 : **47** : 69–75.

Investigations of the effect of heavy metal salts and of change in the *p*H upon the mutation rate in *Drosophila virilis* are reported.

1024. Auerbach, C. and Robson, J. M. 575.243:581.04

Chemical production of mutations.

Nature, Lond. 1946 : **157** : p. 302.

Mustard gas and three closely related substances have been found effective in inducing mutations and chromosomal aberrations in *Drosophila*. Lewisite was not effective.

*CYTOLOGY 576.3

1025. Danielli, J. F. 576.31:581.192

Cytology, biophysics and biochemistry.

Nature, Lond. 1946 : **157** : 321–22.

A report is presented of the symposium arranged by the Biochemical Society on the "The Chemical Basis of Cell Structure and Function". The principal contributors were J. F. Danielli, J. H. Schulman, W. T. Astbury, E. Stedman, J. N. Davidson and E. J. Conway.

1026. Resende, F. 576.312.315

Behaviour of the "nucleolar olistherozone".

Nature, Lond. 1946 : **157** : p. 266.

The author offers further suggestions as to the mutual relations of the nucleolus and olistherozone in the higher plants.

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* General studies, see also individual crops.

1027. SESHACHAR, B. R. and SRINATH, K. V. 576.312.315
The nucleolus.
Curr. Sci. 1945 : **15** : 9–11.
The composition and function of the nucleolus in plant and animal cells are discussed in the light of recent investigations.

1028. CHU, J. 576.312.32:578.65
Reaction of nucleic acid to acetocarmine.
Nature, Lond. 1946 : **157** : 513-14.
Chromosomes will stain satisfactorily with acetocarmine after pretreatment with hydrochloric acid if the pretreatment does not exceed 15 minutes. Differentiation of chromosomes may be helped by a preliminary hydrolysis of the cytological material with N hydrochloric acid at 50–60° C. for a period of three minutes.

1029. CATCHESIDE, D. G., LEA, D. E. and THODAY, J. M. 576.356:537.531
Types of chromosome structural change induced by the irradiation of *Tradescantia* microspores.
J. Genet. 1946 : **47** : 113–36.
A detailed classification is presented of the types of chromatid break, isochromatid break, intra-change and interchange induced in *Tradescantia* after treatment with X-rays or γ-rays. It is calculated that 0·09 chromatid breaks are produced per nucleus per roentgen of X-rays.

1030. CATCHESIDE, D. G., LEA, D. E. and THODAY, J. M. 576.356:537.531
The production of chromosome structural changes in *Tradescantia* microspores in relation to dosage, intensity and temperature.
J. Genet. 1946 : **47** : 137–49.
The number of chromatid breaks following exposure of *Tradescantia* microspores to X-irradiation is proportional to the dose, independent of exposure time per dose, and only slightly dependent on temperature. The number of isochromatid breaks increases slightly more rapidly than the first power of the dose, possibly decreases with increased exposure time per dose, and diminishes rapidly with increased temperature. The number of interchanges produced increases slightly less rapidly than the square of the dose, diminishes with increased exposure time per dose, and diminishes rapidly with increased temperature.
Most isochromatid breaks are 1-hit, while interchanges are usually 2-hit.
Equivalent doses of γ-rays produce slightly fewer interchanges than do X-rays.

*BOTANY 58

1031. CRANE, M. B. 582:575.1:633
The classification of horticultural plants, varieties, synonyms and strains.
J. R. Hort. Soc. 1946 : **71** : 56–61.
The use of genetical knowledge in classification is discussed.

*PLANT DISEASES AND PESTS 632

1032. SANSOME, E. R. 632.421.9:575.114
Maintenance of heterozygosity in a homothallic species of the *Neurospora tetrasperma* type.
Nature, Lond. 1946 : **157** : 484–85.
Segregation and crossing-over are considered for the homothallic ascomycete *N. tetrasperma* in which two nuclei of opposite mating types are normally included in each ascospore.

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* General studies, see also individual crops.

1033. WHITEHOUSE, H. L. K. and HALDANE, J. B. S. 632.421.9:576.354.4
Symmetrical and asymmetrical reduction in ascomycetes.
J. Genet. 1946 : **47** : 208–12.
In *Neurospora sitophila* and *Bombarida lunata* asymmetrical post-reduction is more frequent than symmetrical post-reduction. This has not been found to be the case in *N. crassa.*

1034. SRINATH, K. V. 632.422.3:576.312
The cytology of the yeast.
Curr. Sci. 1946 : **15** : p. 25.
Nuclear bodies giving a positive Feulgen reaction are reported in a strain of *Saccharomyces cerevisiae.* These bodies appear in different loci in the intracellular vacuole; they vary in number from one to five, and also in size and shape in adjacent cells. The chemical composition of the nucleic acid in the *Zygosaccharomyces* is briefly discussed in the light of the results.

1035. SRINATH, K. V. 632.422.3:576.312:578.65
The chromosomes of *Saccharomyces cerevisiae.*
Curr. Sci. 1946 : **15** : 50–51.
Further investigations on the nuclear structure of *Saccharomyces cerevisiae* are reported (cf. Abst. 1034 above). A description is given of an improved staining technique by means of which differentiation of the centriole from the chromosomes can be obtained. The problems of the nature of the yeast chromosome are discussed in view of the finding that the yeast cell contains Feulgen negative chromatin in the chromosomes and a small amount of Feulgen positive chromatin in association with the centriole.

1036. JACKSON, H. S. 632.452:576.12
Life cycles and phylogeny in the higher fungi.
Trans. Roy. Soc. Can. 1944 : **38** : Sect. V : Ser. III : Pp. 32.
Comparisons are made between the life cycles of the Uredinales and the Rhodophyceae, the author concluding that a *prima facie* case can be presented for deriving the rusts phylogenetically from the red algae.

1037. 632.8–1.521.6:575:633
BAWDEN, F. C. 632.8:577.1
Virus diseases of plants.
J. R. Soc. Arts 1946 : **94** : 136–68.
An illustrated general account is given of the behaviour of viruses in plants. A discussion of breeding for local necrotic reaction, hypersensitivity, and the carrier type of variety, and observations and present theories on the chemical and physical properties of the viruses, and their size and multiplication is included.

CEREALS 633.1

1038. ARMSTRONG, S. F. 633.1(42)
Cereal varieties for spring sowing.
J. Minist. Agric. 1946 : **52** : 481–82.
Notes are given on recommended varieties of spring wheat, oats and barley (cf. Abst. 1039 below).

1039. 633.1(42.59)
Varieties of cereals for spring sowing.
Fmrs' Leafl. Nat. Inst. Agric. Bot., Cambridge 1946 : (Revised Ed.) No. 2 : Pp. 4.
Notes are given on recommended varieties of spring wheat, oats and barley.

1040. 633.1(94)
Pedigree seed. Cereal varieties available for distribution.
J. Agric. W. Aust. 1945 : **22** : 232–36.
Recommended varieties of wheat, oats and barley, now available as pedigree seed, are described.

1041. 633.1:575(54.7)
633.85:575(54.7)
635.657:575(54.7)

Improved strains of important cereal, pulse and oilseed crops evolved by the Department of Agriculture, Bombay Province.

Leafl. Dep. Agric., Bombay Province 1944 : No. 1 : Pp. 10.

Agricultural data on improved strains of wheat, rice, sorghum, *Pennisetum typhoideum*, *Eleusine coracana*, linseed, castor oil, safflower, *Sesamum*, groundnut and *Cicer arietinum* are listed.

1042. LARMOUR, W. T. 633.1:575(71)

Never ending search continues for new and better varieties of cereal grains. Dominion Cereals Division has many projects underway.

Canad. Grain J. 1946 : **1** : No. 8 : p. 13.

A brief account is given of objectives of the Dominion Cereals Division in wheat, oats and barley breeding.

WHEAT 633.11

1043. MANN, H. H. 633.11

Wheat in the Middle East.

Emp. J. Exp. Agric. 1946 : **14** : 31–42.

A survey is presented of wheat cultivation in the various countries of the Middle East. The need for unmixed, early maturing and rust resistant varieties is stressed as one of the essential conditions for the extended cultivation of the crop.

1044. SANSOM, T. K. 633.11:575(68.9)

Wheat. Varieties tested at the Plant Breeding Station, Salisbury, and available for distribution.

Rhod. Agric. J. 1945 : **42** : 486–87.

Notes are given on 14 recommended wheat varieties now available for distribution. Matopo is a new variety bred at the Plant Breeding Station, Salisbury. It is a bearded, black-awned wheat with dense ears. The variety is fairly resistant to rust, and has strong straw. It has given a good performance both on vlei land and under irrigation.

1045. 633.11:575.12(93.1)

Work in progress.

N.Z. Wheat Rev. 1945–46 : Publ. No. 42 : 8–10.

A selection of the cross Tainui x Tuscan (No. 78,01) has outyielded Cross 7 in most trials during the several years. It is earlier maturing than Cross 7, and similar in height and baking quality to this variety, but its straw is less strong. The selection is to be further tested, particularly in those districts where earliness in maturity is important. Two lines from the cross Tainui x Cross 7 are of interest. One has given 10% higher yields than Cross 7. The other, 140,014, has shown a baking quality superior to that of Cross 7 and even of Marquis. In a large scale field test at Lincoln this wheat equalled Cross 7 in yield, and matured slightly earlier.

1046. ELLERTON, S. 633.11:575.123:575.41:575(42)

Applied natural selection.

Fmr's Wkly, Lond. 1946 : **24** : p. 37.

The theoretical advantages and disadvantages of using mixtures of pure wheat varieties and of wheat hybrids to obtain better local adaptation and increased yields are discussed. The author suggests that hybrid mixtures have offered sufficient promise in pioneer work to warrant detailed experimental investigation.

1047. ELLERTON, S. 633.11:575.148:575(42)

In search of bigger wheat crops.

Fmr's Wkly, Lond. 1946 : **24** : p. 31.

The validity of pure line wheat breeding is criticized. The author expresses the view that present breeding methods are likely to result in only very slow and slight further improvement in yield, and suggests that sowing a mixture of wheats will usually give a better yield than a single pure variety (cf. Abst. 1046 above).

1048. 633.11–2.451.2–1.521.6(93.1)
Fife-Tuscan resistant to loose smut.
N.Z. Wheat Rev. 1945–46 : Publ. No. 42 : p. 17.
A note is given on the loose smut resistance of the new wheat variety Fife-Tuscan. This variety is more resistant than Cross 7, Dreadnought, Tainui and Jumbuck.

1049. Fuggles-Couchman, N. R. and Wallace, G. B. 633.11–2.452:576.16:631.521.6(67.8)
Cultivation and diseases of wheat.
Pamphl. Dep. Agric. Tanganyika 1945 : No. 38 : Pp. 19.
Descriptions of several wheat varieties are included, and an account is given of the physiological races of stem rust and their occurrence on certain varieties.

1050. Macindoe, S. L. 633.11–2.452:576.16:631.521.6:575(94)
New stem rust resistant wheats to replace Eureka.
Agric. Gaz. N.S.W. 1945 : **56** : 530–31.
In 1942 the stem rust resistance of Eureka and Eureka 2 in New South Wales failed as the result of the appearance of a new biotype of race 34. It is reported that the following new stem rust resistant varieties are becoming available: Gabo, Charter, Kendee, Yalta and Celebration.

1051. 633.11–2.452–1.521.6:575.12(94)
Four new recommended wheats which combine stem rust resistance with yield and quality.
Agric. Gaz. N.S.W. 1946 : **57** : 3–6.
The new varieties, Gabo, Kendee, Yalta and Celebration, are described. These varieties are stem rust resistant and give high yields of grain with moderate to high baking quality. Their respective origin is given as follows: Bobin selection x Gaza x Bobin selection, Dundee x Kenya (U.A. No. 745), Kenya x Pusa 4 x Dundee, and double cross x Dundee x Dundee. The double cross parent in the latter hybrid is a sister line of Thatcher (Marquis x Kanred x Marquis x Iumillo). Gabo is also resistant to leaf rust. Kendee, Yalta and Celebration are resistant to flag smut, but Gabo is moderately susceptible. Yalta is recommended as main crop variety. Gabo is an early maturing variety, and Kendee matures approximately two weeks later than Gabo; Celebration is late maturing.

1052. Simmonds, P. M. and Sallans, B. J. 633.11–2.484–1.521.6(71)
Testing wheat seedlings for resistance to *Helminthosporium sativum*.
Sci. Agric. 1946 : **26** : 25–33.
Varietal differences in resistance in the seedling stage to *Helminthosporium sativum* are reported. Marquis, Thatcher, Red Bobs and Apex exhibited more resistance than Mindum, Regent, Reward, Pelissier and Renown. Varietal differences in reaction to inoculation with *Fusarium culmorum* were not marked, but were sufficient to warrant further investigation.

1053. 633.11–2.7–1.521.6:575(71)
"Rescue" new wheat variety forward step in fighting sawfly ravage in west.
Canad. Grain J. 1946 : **1** : p. 8.
Rescue is a sawfly resistant wheat variety produced by the Dominion Experimental Farm, Saskatchewan, from a cross between the tough-stemmed New Zealand variety S–615, originally from Portugal, and the rust-resistant Apex variety. Rescue is stem-rust resistant but susceptible to leaf rust and bunt. The variety is poor in quality for bread making, and will not be graded higher than No. 3 Manitoba Northern. Work is being carried out to develop a high grade sawfly-resistant wheat with good baking quality.

1054. 633.11:664.641.016(93.1)
Baking quality of the 1944–45 crop.
N.Z. Wheat Rev. 1945–46 : Publ. No. 42 : 6–7.
A summary is given of the 1944–45 quality tests of the chief wheat varieties. In New Zealand as a whole, Cross 7 again gave the best quality flour.

1055. ELLERTON, S. 633.11.00.14(42.67)
A wheat yield trial in Maldon.
Agric. Bull., Essex 1944 : **2** : 84–86.
A summary is given of the results of the first trial of wheat at Maldon, conducted in 1943–44. Data are presented on the grain yield, length of straw, resistance to lodging and time of ripening of 31 varieties. Observations were also made on varietal resistance to *Erysiphe graminis* (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 1074).

1056. ELLERTON, S. 633.11.00.14(42.67)
The Maldon wheat variety trial, second year's results.
Agric. Bull., Essex 1945 : **3** : 95–96.
The results of the second trial of wheat varieties at Maldon, held in 1944–5, are summarized. Data are given on the grain yield, straw strength, and resistance to sprouting in the ear of 38 varieties, and the yields obtained in 1944 and 1945 are compared. The trials are to be continued in 1945–6.

MAIZE 633.15

1057. 633.15:575.12(71.3)
Corn hybrids recommended for production in Ontario—1946.
Suppl. Pamphl. Dom. Can. Dep. Agric. 1946 : No. 22 : Pp. 2.
The maize hybrids recommended for production in Ontario are listed according to maturity and on the basis of climatic zones.

BARLEY 633.16

1058. BAKER, J. L. and
WARD, T. J. 633.16:581.6(42.59)
Malting and brewing trials with three types of English barleys.
J. Inst. Brew. 1946 : **52** : 17–25.

HUNTER, H.
Appendix.
Ibid. 1946 : **52** : 25–26.
The results of malting and brewing trials under ordinary brewing conditions are reported for the new barley varieties, Early Ripening Spratt-Archer (B N 151), New Type Archer-Spratt (B N 150) and the control variety Spratt-Archer (B N 8). All three varieties have been developed at the Plant Breeding Institute, Cambridge.
The appendix describes the performance of B N 151 and B N 150 in field trials conducted during the period 1943–45 by the National Institute of Agricultural Botany.

1059. 633.16:581.6:575(42)
633.79:575(42)
Annual Report of the Council of the Institute of Brewing for the year ended 31st December, 1945 : Pp. 23.

Barley
At Birmingham University, investigations on dormancy and the effect on malting quality have been conducted. The comparative study of a number of varieties harvested in 1944 showed that varietal differences in germinative energy have an important effect on malting quality.
The regional trial work of the National Institute of Agricultural Botany, Cambridge, was resumed in spring, 1945 and a new series of trials was arranged at seven centres in six different counties. The early ripening selection of Spratt-Archer was placed in the trials, with normal Spratt-Archer and Plumage-Archer as controls. Two new early ripening barleys derived from a cross between Spratt and Maja were also included, with the Danish variety Kenya as control. In the year under review the selections from the cross between Spratt and Maja gave higher yields than Kenya and the straw stood well; the early ripening selection of Spratt-Archer gave yields slightly below those of normal Spratt-Archer. Malting and brewing trials were also carried out.

Hops
At East Malling, investigations on seven clonal families of Goldings have been continued. No marked differences in cropping have been observed between the early and late groups. The Early Bird selection, however, continues to have a much higher P.V. than any of the other Goldings. In the season under review the selections have shown significant differences in cone size, petal

number and amount of seed. The clones also differed in the number and size of rooted sets produced from strap cuts.

An experiment on the variability of the P.V. of individual hills of two Fuggle clones was repeated. Over 100 individual hills of Fuggles hops from different sources are under observation with a view to further selection and trial. Different varietal reactions to different methods of propagation have been found. Trials of varietal resistance to *Verticillium* wilt are reported. The reaction of the Wye varieties to the nettlehead virus is under investigation.

1060 633.16:581.6:575(42)
633.79:575(42)

The reconstruction of the research organization.
Inst. Brew. [1946?] Pp. 32.

Appendices 2, 3 and 8 are of special interest to plant-breeders. Appendix 2 summarizes future work on the breeding, selection and growing of hops. Appendix 3 gives the programmes of research on barley, and refers to the breeding of new varieties and investigations on the composition of barleys and malts. Appendix 8 presents the memorandum on proposed researches of malting barley to be carried out by the Plant Breeding Institute and National Institute of Agricultural Botany at Cambridge in the post-war years.

1061. Newton, M.,
Peturson, B. and
Meredith, W. O. S. 633.16–2.452:581.6(71)
The effect of leaf rust of barley on the yield and quality of barley varieties.
Canad. J. Res. 1945 : **23** : Sect. C : 212–18.

A study was made of the effect of leaf rust, *Puccinia anomala* Rostr., on the yield, grade of the grain, and the malting quality in the following barley varieties: O.A.C. 21, Mensury, Chevron, Peatland, Regal and Plush. With the exception of Mensury, leaf rust infection caused significant reductions in the yield, 1000 kernel weight and bushel weight. In all varieties malting quality was adversely affected on account of the reduction in the percentage of heavy kernels. The nitrogen content of the barley and wort showed reduction as a result of leaf rust. The malt extract and diastatic capacity were, however, not greatly affected. Differential response to leaf rust infection were exhibited by the varieties in all the characters studied. The data suggest that Mensury and O.A.C. 21 are more resistant to leaf rust than the other varieties tested.

SORGHUM 633.174

1062. 633.174:575.11.061.63:582
Laubscher, F. X. 633.174:581.46:575.11:582
A genetic study of sorghum relationships.
Sci. Bull. Dep. Agric. S. Afr. 1945 : No. 242 : Pp. 22.

Data on the inheritance of several characters in the cultivated sorghums are reported which have a bearing on taxonomical problems; and an attempt is made to explain the conflicting results obtained by American and Indian investigators.

The type of lower glume with longitudinal nervation which distinguishes the Kaoliang varieties behaved as a single recessive to the character of coriaceous glume. Linkage was found between the two character pairs, coriaceous hairy lower glume and serrated glabrous lower glume.

Non-dehiscence of the pedicelled spikelets showed partial dominance over the dehiscent character of the pedicelled spikelets distinguishing the Feterita types.

Awn development was not found to be similarly conditioned in all types. Among the Indian sorghums the awned condition is a dominant character, while among the South African types it appears to be recessive. Crosses between different geographical forms, however, gave results which could not be interpreted upon the basis of simple Mendelian inheritance. Data from crosses of the Indian variety Shallu with types from other parts of the world indicated polymeric inheritance of awn development.

Plant height was not found to be a monofactorial character, in contrast to the results of investigations on this character within a single group or variety. In the cross Shallu x G.S. Manchu, height and plant colour were found to be linked, brown plants (*p*) generally being taller than purple (*P*). These results are analysed on the basis of the assumption of different modifier backgrounds in distinct geographical types.

Blackish purple plant colour showed dominance over reddish purple in the cross between Oxley [*Sorghum Dochna* (Forsk.) Snowden], with black chaff, and Baresca (*S. caffrorum* Beauv.), with red chaff, as opposed to the dominance of reddish colour (*Q*) over blackish (*q*) reported in other crosses. The dominant black chaff colour was also shown in the cross Basuto x Red Ambercane. In brown plants both a dominant and recessive red plant colour was observed. Indication was obtained that all *pp* plants are probably red, no blackish brown plants of the genotype *ppqq* having been observed. The interaction of the *P* and *Q* factors is to be further investigated.
The inheritance of brown nucellar colour and its relation to plant colour was studied. From an analysis of the results obtained by the author and other investigators, it is suggested that the South African types differ genetically from Indian types in respect of nucellar colour. The South African types have only one *B* factor for nucellar colour, it is suggested, while the Indian types possess two complementary factors, B_1 and B_2, for this character. The South African types also have the factor *S* for the development of brown colour in the pericarp. The Indian types, which are mostly pearly types with a thin mesocarp, have apparently not mutated at the *S* locus. It is further suggested that a factor, designated *C* and occurring mainly in brown plants, determines the expression of the factor *Q* for plant colour in the glume and nucellar layer, and that the factor pair *Cc* and not *Qq* is linked with the main factor pair for nucellar colour B_1b_1. Incomplete data on the colour of the stigma and grain show that stigma colour is not necessarily a secondary effect of the factor *R* for grain colour. Indication of an allelomorphic colour series was obtained.
In view of the genetic differences found among the various types, the author questions the validity of classifying all the cultivated sorghums as varieties of a single large species, and suggests the classification of the cultivated sorghums into races.

RICE 633.18

1063. Soyza, D. J. de — 633.18:575(54.8)
Hill paddy cultivation in Ceylon.
Trop. Agriculturist **1944** : **100** : 211–18.
A programme of selection of pure lines and hybridization among the 60 or more local varieties is envisaged, which will produce high-yielding strains for the wet and semi-wet zones, and also suitable drought-resistant types to replace the millets in the dry zone. Preliminary trials of local varieties are being conducted at Peradeniya and several localities in the dry zone.

1064. Hedayetullah, S. and Ghosh, B. N. — 633.18:576.356.5:581.04
The effect of colchicine on rice.
Curr. Sci. **1946** : **15** : 74–75.
A preliminary account is given of the effect of treating seeds and seedlings of Dhairal Aus paddy and subsequent generations with colchicine.

LEGUMINOUS FORAGE PLANTS 633.3

1065. — 633.31(42.59)
Lucerne.
Fmrs' Leafl. Nat. Inst. Agric. Bot., Cambridge **1946** (Revised Ed.) No. **4** : Pp. **4.**
Recommended strains are described.

1066. Nutman, P. S. — 633.321–2.3–1.521.6:575.11
Genetical factors concerned in the symbiosis of clover and nodule bacteria.
Nature, Lond. **1946** : **157** : 463–65.
It has been shown that genetical differences in red clover and in the *Rhizobium* strains able to infect it are both significant in determining the symbiotic relationships of these two organisms. Four independent categories of genetical variation have been demonstrated in the clover: (1) resistance or susceptibility to *Rhizobium*, (2) nodule number after infection has occurred, (3) stage of development at which primary infection occurs, and (4) effectivity response. The genetical factors determining the mode of inheritance of these various reaction patterns are discussed.

1067. 633.491(42.59)

Varieties of potatoes.

Fmrs' Leafl. Nat. Inst. Agric. Bot., Cambridge 1946 : (Revised Ed.) No. 3 : Pp. 4.

Notes are given on recommended varieties.

1068. BALD, J. G. 633.491:581.143.26.03

A plan of growth, maturity and yield of the potato plant.

Emp. J. Exp. Agric. 1946 : **14** : 43–48.

Growth, maturity and yielding capacity in the potato are subjected to a physiological analysis, based upon the principle of competition between the plant organs for the available metabolic products. The analysis is considered to be valuable in accounting for varietal differences in growth form measurements, maturity and yield under similar environmental conditions, and the behaviour of a single variety under different environmental conditions, such as different photoperiods. To illustrate the application of the method, an interpretation is given of the behaviour of Katahdin and Bismark in different parts of the world.

1069. HAWKES, J. G. 633.491:581.143.26.035.1

Potato "bolters": an explanation based on photoperiodism.

Nature, Lond. 1946 : **157** : 375–76.

Preliminary experiments have suggested that bolting in the potato may be the expression of short-day photoperiodic adaptability, which may arise through genetic mutation in the normal long-day forms.

1070. PLANK, J. E. VAN DER 633.491:581.143.26.035.1:576.16:582:001.4

Origin of the first European potatoes and their reaction to length of day.

Nature, Lond. 1946 : **157** : 503–05.

Both on historical grounds and from a study of presumptive relic potato varieties from Basutoland, the author concludes that the original potato varieties introduced into Europe were short-day forms. He recommends that *Solanum tuberosum* and *S. andigenum* be lumped.

1071. SALAMAN, R. N. 633.491:581.45:576.16:582

The early European potato: its character and place of origin.

J. Linn. Soc. (Bot.) 1946 : **53** : 1–27.

The different views on the origin of the domestic potato are discussed, and the characters used by the Russian observers to distinguish *Solanum andigenum* and *S. tuberosum* are critically examined. Approximately 140 varieties of *Solanum andigenum* have been classified by the author into six different intergrading groups on the basis of leaf characters. These groups show a transition from forms typical of *S. andigenum* to forms typical of the domestic varieties commonly classified as *S. tuberosum*. It is suggested that the *S. tuberosum* varieties are derivatives of the original stock of potatoes with $2n = 48$ which grows in the Andes and has been described by the Russian workers under the specific name of *S. andigenum*, and that there is only one species of cultivated potato, viz. *S. andigenum*. Groups I to III, i.e. groups with predominantly *S. andigenum* characters, are to be found most abundantly in the Andean region of Lake Titicaca, the generally accepted centre of distribution of this species. The greater the distance from this region, the more frequent is the occurrence of Groups IV to V, until some 1500 miles north, a few varieties of unquestionable native origin are to be found with all the essential characters of *S. tuberosum*. The evidence suggests that to the south of this region also, in Chile and the Island of Chiloé, Groups IV to VI predominate. In the author's view the distribution of the forms resembling *S. tuberosum* may be attributed to their selection value, since the larger, more developed leaf is better adapted to the climate in the north and south of the distribution area of *S. andigenum*. Historical details on the type of the first potatoes cultivated in Europe are discussed, and it is found that the earliest grown potatoes appear to have been short-day plants, i.e. plants with the photoperiodic response of *S. andigenum*, surviving however under long-day conditions. Data on segregation of leaf type and on the inheritance of photoperiodic reaction are also given in support of the view that *S. tuberosum* varieties are specialized forms of *S. andigenum*.

The author suggests that the place of origin of the European potato is the northern extremity of the distribution area of *S. andigenum*, Colombia being the most likely country. It is suggested also that at least one importation of the potato into Europe reached Spain not later than 1569, and that the potato was transported from some northern port in South America, possibly Cartagena.

1072. 633.51:575(72.9)

Annual Report on the Agricultural Department, St. Vincent 1944.

(1945) : Pp. 19.

The Cotton Experiment Station was closed during 1944, in view of the completion of the work of improving the St Vincent V.135 Superfine cotton. The work of the station is now the responsibility of the Camden Park Experiment Station. During the final 1943–44 season, work on VH progenies was carried out at the Cotton Experiment Station.

1073. HUTCHINSON, J. B. 633.51:575.115:575.113.3

The crinkled dwarf allelomorph series in the New World cottons.

J. Genet. 1946 : **47** : 178–207.

A description is given of the nature and distribution of the *Cr* alleles of New World cottons. Rugose (cr^l) and contorta (cr^c) are two mutant forms which give rise to leaf abnormalities. They control two separate physiological systems, one concerned with vein growth and the other with lamina development; each is affected by a modifier system.

The distribution of these modifier systems is discussed in connexion with theories on the evolution of dominance.

1074. KNIGHT, R. L. 633.51:575.12

The theory and application of the back-cross technique in cotton-breeding.

J. Genet. 1945 : **47** : 76–86.

A back-crossing technique is discussed, by means of which four distinct genes from three cotton species have been successfully transferred to two commercial strains of *G. barbadense* L., and several intraspecific transferences have been made in *G. hirsutum* L.

1075. STEPHENS, S. G. 633.51:575.42:575.113.4

The genetics of "corky". I. The new world alleles and their possible role as an interspecific isolating mechanism.

J. Genet. 1946 : **47** : 150–61.

The character "corky" is exhibited by certain interspecific hybrids between *Gossypium hirsutum* var. *marie-galante* and *G. barbadense*, and is determined by the co-incidence of the complementary alleles ck^x and ck^y. Affected plants are stunted, heavily suberized and more or less female sterile. The complementary genes involved are most common in the region of overlap of the two species concerned. It is suggested therefore that these genes have been favoured by human selection acting on the two species which were formerly grown together in mixed cultivation, for corky hybrids are easily detected and rogued, thereby preventing interspecific crossing and subsequent degeneration.

1076. SILOW, R. A. 633.51:581.44:576.16:575.116.1.061.63

Evidence on chromosome homology and gene homology in the amphi-diploid New World cottons.

J. Genet. 1946 : **47** : 213–21.

Linkage has been found between the gene R_2 for anthocyanin pigmentation and the gene determining the character of short branch in the New World tetraploid cottons. The linkage group is a duplicate of one previously reported by other workers, and its recognition as such gives further support of the hypothesis of the amphidiploid origin of the New World cottons. The genetical processes involved in the origin and evolution of amphidiploids are discussed.

1077. THORIA, L. and AHMAD, N. 633.51:581.6(54)

The analysis, grading and utilization of Indian linters.

Technol. Bull. Indian Cent. Cott. Cttee 1943 : No. 34 : Pp. 24.

Approximately 40 samples of cotton linters representing various types of seed were analysed and graded by three different methods.

1078. ROSS, J. G. and BOYES, J. W. 633.52:576.356.5:581.04(71)

Tetraploidy in flax.

Canad. J. Res. 1946 : **24** : Sect. C : 4–6.

The colchicine-treated material consisted of the variety Redwing and the F_1 hybrid of Bison x

Redwing. Treatment of the epicotyl of seedlings with colchicine in lanolin emulsion proved to be the most satisfactory method of producing tetraploids. The tetraploids had larger seeds than the diploids, but gave lower yields on account of their lower fertility and later maturity.

SUGAR PLANTS 633.6

1079. McM...., A. 633.61:575(68)

A newly released cane. Some notes on N:Co. 310.
S. Afr. Sug. J. 1946 : **30** : p. 91.

An account is given of the new variety N:Co.310 (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 561).

1080. 633.61:575(69.82)

Fifteenth Annual Report of the Sugarcane Research Station, Department of Agriculture, Mauritius 1944 (1945) : Pp. 23.

Breeding included the nobilization of *S. officinarum*, the nobilization of *S. spontaneum* from Java, and crosses involving various *Saccharum* species. Several seedlings of one population of F_1 hybrids involving *S. robustum* were promising in type and juice quality, although further hybridization may be necessary before commercial varieties are obtained.

First, second and third year seedling trials, and variety trials are reported. At Réduit, selection is based upon ratoon selection only, while at the Pamplemousses Experiment Station, both virgin and ratoon selection is practised. The two outstanding selections in the second year trials, M.308/40 (M.112/34 x D.109) at Pamplemousses and M.405/40 (M.134/32 x M. 27/16) at Réduit, are both ratoon selected seedlings. In the third year trials at Pamplemousses the selected varieties M.63/39, M.65/39 and M.76/39 gave superior yields of sugar per acre in comparison with the standard varieties M.134/32 and M.112/34, although they were slightly lower in sucrose percentage. The selected variety M.4/39 also gave a satisfactory performance. All four varieties have reached the trial stages. Over ten varieties of the M./40 series are considered promising. In a trial of seedlings selected for poor soil condition at Réduit, M.41/38, a variety with a parentage involving B.H.10(12), P.O.J. 2878 and Uba Marot, has given a very high sucrose percentage. As a result of the varietal trials it appears that M.64/36 has potentialities as a commercial variety.

1081. 633.61:575(72.9)

Eleventh Annual Report ending September 30, of the British West Indies Central Sugar Cane Breeding Station, Barbados 1944 : Pp. 41.

The new B.46 series of crosses, now planted in the field nursery, consists of 108 crosses, 107 of which are nobilizations. The following canes were used extensively as parents and have given seedlings of a high standard: the noble cane B.3439; the Glagah nobilizations, B.3337, B.3353, B.3354 and P.O.J.2878; the Celebes nobilizations, B.35197 and B.35247; and varieties of mixed derivation, such as B. 34104, B.35218 and Co. 290.

The report is given of progress with the B.45′, B.44′, B.43′, B.42′ and B.41′ series of seedlings, the results of the select seedling and co-operative variety trials, and of the performance of seedlings in the contributing colonies. Notes are included on the promising new seedlings B.37193, B.4098, B.40105 and B.40116.

Mosaic disease investigations were begun in 1943. Selections of the B.41′ series were tested for mosaic resistance, inoculations being obtained from the B.2935 and B.34104 varieties. Of the resistant seedlings, ten are Glagah derivatives, while the remaining five have B.3439 as the female parent. The technique of artificial inoculation was however found to be unsatisfactory, and work has since been concentrated upon the development of a reliable technique.

1082. 633.61:575(94.3)
633.61–2–1.521.6(94.3)

Forty-fifth Annual Report of the Bureau of Sugar Experiment Stations, Queensland 1945 : Pp. 27.

The varietal trials conducted at the Sugar Experiment Stations are reported.

The Report of the Committee on Seedling Propagation contains a list of the crosses made during 1945 in the hybridization programme of the Northern Experiment Station, near Gordonvale; the crosses totalled 113. The report also contains notes on some of the newer varieties and a survey of the varietal position in Queensland since 1933. Two seedlings from the Bundaberg Experiment Station, have been named as Q varieties; Q.51 has been derived from the cross

P.O.J. 2725 x Co. 290 and Q.52 from the cross P.O.J. 2875 x H.Q. 409. Both varieties have given a good performance in the Station trials.

In the Report of the Division of Entomology and Pathology, reference is made to varietal resistance to the grey-back cane beetle (*Dermolepida albohirtum* Waterh.), gumming disease, leaf scald (*Bacterium albilineans* Ashby), downy mildew (*Sclerospora Sacchari* T. Miy.), Fiji disease and mosaic.

1083. 633.61:575.42(69.82)

Résumé du rapport de la Station de Recherches sur la canne à sucre pour l'année 1944. (**Summary of the report of the Research Station on sugar cane for the year 1944**).

Rev. Agric. Maurice 1945 : **24** : 203–08.

Selection work has continued to produce sugar cane varieties adapted to the local conditions of Mauritius.

1084. D....., N. L. 633.61:582

A review of the genus *Saccharum*.

Indian Fmg 1945 : **6** : p. 581.

The taxonomy of the genus *Saccharum* is receiving attention at the Imperial Sugar Cane Station, Coimbatore. This note summarizes the present position of the genus. It is mentioned that the Coimbatore Station is planning to organize an expedition to collect the various forms of *Saccharum* and allied genera for detailed taxonomic investigation and to obtain new breeding material.

1085. Mungomery, R. W. 633.61–2–1.521.6(94)

Bureau of Sugar Experiment Stations. Report of the Division of Entomology and Pathology—No. 2.

Aust. Sug. J. 1946 : **37** : 433–36.

Data are given on varietal resistance to several diseases.

1086. 633.61–2.3–1.521.6:575.12(69.82)

Stevenson, G. C. 633.61–2.483–1.521.6:575.12(69.82)

Trois nouvelles variétés de canne à sucre. (**Three new varieties of sugar cane**).

Rev. Agric. Maurice 1945 : **24** : 253–58.

Three new varieties of sugar cane are described: M.165/38, from M.134/32 x M.196/31, M.63/39, from M.134/32 x M.99/34 and M.76/39, also from M.134/32 x M.99/34. All three forms yield well and show varying degrees of resistance to gummosis and red rot.

1087. 633.63(42.59)

Strains of sugar beet.

Fmrs' Leafl. Nat. Inst. Agric. Bot., Cambridge 1945 (Revised Ed.) No. 5 : Pp. 4.

Descriptions are given of recommended strains.

1088. Chandraratna, M. F. and
Nanayakkara, K. D. S. S. 633.682:582(54.8)

Studies in cassava. I. A classification of races occurring in Ceylon.

Trop. Agriculturist 1944 : **100** : 219–30; 1945 : **101** : 3–12.

Races of cassava (*Manihot utilissima* Pohl) occurring in Ceylon are described and a key to their identification is presented. Notes are given on 50 of the total 75 races distinguished by the author.

STIMULANTS 633.7

1089. 633.72:575.42

Nineteenth Annual Report of the Board of the Tea Research Institute of Ceylon for 1944.

Bull. Tea Res. Inst. Ceylon 1944 : No. 26 : Pp. 66.

Yield data are given for clones planted during the period 1937–41. It has been observed that the free-branching habit is an important factor in the production of high yields in the early years of growth. Counts were made of the "flush" and "banji" buds in the second year of plucking in the 1937–38 clones and also in the first 20 pluckings of the 1941 clones. In the 1937–8 clones 32–53% of the buds were banji, in the 1941 clones 36–58%. No relationship was found between yield and percentage of banji buds.

Investigations on the eelworm (*Anguillulina pratensis*) are reported. During the first two years of growth some plants have shown tolerance to the pest. Field observations confirm the apparent absence of phloem necrosis in the high jat bushes.

1090. NARASIMHA SWAMY, R. L. 633.73:575.247
Brief note on somatic variation in "Kents" strain of *Coffea arabica* L.
Curr. Sci. **1946** : **15** : 80–81.

A description is given of a mutant sucker of a Kents scion observed at the Balehonnur Coffee Experiment Station.

1091. 633.74:575
Report and Proceedings of the Cocoa Research Conference held at the Colonial Office, London, May–June 1945 : No. 192 : Pp. 168.

The proceedings of the Conference held in 1945 by the Cocoa Research Committee covered the whole field of research in cacao. Among the subjects discussed were the following: general organization of research; varieties of cacao; propagation of cacao; hybridization, selection and breeding; optimum length of life of cacao; and pest and diseases. Recommendations are summarized under the same headings. Appendix I gives the papers presented to the Conference. Some of these papers deal with research in general, and contain references to breeding and genetical work, for example, papers entitled "The Long Term Objectives of Cocoa Research", "The Organization of Cocoa Research in the British West Indies", "The Aims and Objects of the West African Cocoa Research Institute", and "The Plans for Cocoa Research in Colombia". Papers dealing more particularly with the different problems of cacao breeding and genetics are summarized below. Appendix II consists of a paper, "The Design of Field Experiments with Cocoa" by T. N. Hoblyn of the East Malling Research Station, which was read at a meeting held to consider the statistical lay-out of field experiments on cacao. The paper discusses the general principles of designing field experiments of fruit trees.

Nicol, J. — *The present position of research on capsid pests of cacao in West Africa.* (*pp.* **111–13**).

A clone developed from a tree found at Asuansi with Trinitario characters has shown resistance to both species of capsids, *Sahlbergella singularis* Hagl. and *Distantiella theobromae* Dist.; the clone appears to be more resistant to the latter species than to the former. Marked differences in injury by *D. theobromae* have been observed in a progeny trial at Tafo. The progeny of certain selections escaped damage.

Posnette, A. F. — *Cacao virus research in West Africa.* (*pp.* **114–17**).

Investigations on the identification of strains of the swollen-shoot virus and their relationship are reported. Selection for resistance and tolerance have been carried out in material from the native farms, Trinitario trees, and many types of introduced cacao. Clones have been secured which are without virus symptoms except immediately after budding, when the first flush of scion growth shows typical mosaic. These plants are usually unaffected by reinfection with the virulent strain A.

West, J. — *The development of cacao selection in Nigeria.* (*pp.* **124–28**).

Selection for yield on the Moor Plantation is described. Approximately 50 selections of yellow pod Amelonado cacao have been secured as a result of work during the period 1921–31. Selection T38 appears to be outstanding in both yield and bean size. Since the production of vegetatively propagated planting material is impracticable owing to transport difficulties, the testing of self-fertilized progenies of these selections and the establishment of clonal plots of each selected tree are being carried out. The progenies of T38 produce 155 wet beans per lb. in comparison with the average yield in Nigeria of 171 wet beans per lb.

Selection for quality is also in progress. After the establishment of clonal plots, selection for bean size, colour, yield and self-compatibility has been carried out. Various introductions have been made. Self-fertilized progenies and the progenies of crosses between the introductions and local selections are now under trial.

No specific attempt is being made to breed for vigour. But it has been found that no increase in vigour results from cross-fertilization as opposed to self-fertilization within the Amelonado cacao.

Pound, F. J. — *A note on the cocoa population of South America.* (*pp.* 131–33).

The distribution of the different types of cacao in South America is described, and an indication of their relationships is given. The value of these types and the information on their relationships in a breeding programme is emphasized.

Pound, F. J. — *The selection of cocoa trees on the basis of productive efficiency and the requirements of the manufacturers of chocolate.* (*pp.* 134–36).

An account is given of selection for uniformity in satisfactory yield. The work of selection consists of the following stages: (1) preliminary field selection based upon the analysis of data on tree size, number of pods produced in a given time, and the weight of wet beans per pod; (2) further selection for other important characters, such as self-compatibility; (3) preliminary clonal selection for disease resistance and other qualities; (4) yield trials including observations on earliness of bearing, growth rates, and the effect of varying seasons; and (5) commercial tests.

Cheesman, E. E. — *Research aspects of quality in cocoa.* (*p.* 146).

The research aspects of quality are briefly discussed. At the Imperial College of Tropical Agriculture, Trinidad, the genetical variation in quality among clones selected from Trinitario material is to be investigated.

Cheesman, E. E. — *Genetical researches on* Theobroma. (*pp.* 147–48).

The aims and organization of genetical and breeding work in *Theobroma* are outlined. The need for type collections of cocoa varieties and *Theobroma* species and for hybridization followed by selection is emphasized. It is suggested that the problems receiving attention at the Imperial College of Tropical Agriculture, Trinidad, in the study of the Trinitario and Criollo groups, should include the causes and the modes of inheritance of self-incompatibility and the inheritance of resistance to witches' broom disease, and the genetics of quality, while investigations at the West African Cocoa Research Institute should be devoted primarily to the various problems of the Amazonian cacaos.

1092. 633.74–2.7–1.521.6(66)
633.74–2.8–1.521.6(66)

Annual Report of the West African Cacao Research Institute, Tafo, April, 1944 to March, 1945 : Pp. 33. (Mimeographed).

This is the first annual report of the West African Cacao Research Institute, recently established on a permanent basis with headquarters at Tafo, in order to concentrate work on disease and pests.

Information is given on the characteristic symptoms produced by the eight different strains of swollen-shoot virus so far identified. The selection of isolated healthy trees in farms infected with swollen-shoot has continued. Five selections show outstanding tolerance to the virulent strain A of the disease, and are being propagated as rapidly as possible by budding. The first growth from the bud exhibits marked mosaic leaf symptoms while subsequent flushes appear normal; certain individuals of these clones have however completely succumbed to the virus. Mature Trinitario trees at Wiawso and Peki are beginning to show differences in reaction to swollen-shoot. Further evidence of virus tolerence has been found among regenerated trees and replanted cacao on certain farms.

Field observations show that certain trees escape serious damage by capsids, and it is suggested that such trees are genetically resistant. Experiments have been carried out to compare the reaction of S.C.1, a resistant Trinitario hybrid from Asuansi, and the common West African Amelonado to *Sahlbergella singularis* Hagl. and *Distantiella theobromae* Dist. Strong indication was obtained that S.C.1. is more resistant to both capsids than Amelonado. Further work on capsid resistant selections is in progress.

No further selection for yield and quality was made, selection now being confined to virus and capsid resistance. The progeny trials of trees already selected for yield and quality have been maintained; it is interesting to note that the Nigerian selection T.38 gave a more vigorous growth than the Amelonado trees selected in the Gold Coast.

The varieties of *Theobroma Cacao* introduced from Trinidad and the *Theobroma* species introduced from Brazil are listed.

OIL PLANTS 633.85

1093. WEBSTER, C. C. 633.854.56:581.165:575.42(68.9)
The cultivation of the tung tree in Nyasaland.
Emp. J. Exp. Agric. 1946 : **14** : 18–24.

In Nyasaland experimental work on the tung tree was begun in 1940. An account is given of unselected seedling populations, mother tree selection, the vegetative propagation of the highest yielding trees, and various cultural methods, including pollination.

1094. WEBSTER, C. C. 633.854.56:581.165:575.42(68.9)
Improved planting material of the tung tree: a progress report.
E. Afr. Agric. J. 1946 : **11** : 165–69.

An account is given of the selection of mother trees of *Aleurites montana*, and experiments on buddings, carried out at the Tung Experimental Station, Nyasaland. Experiments with seedlings raised from open-pollinated seed, clonal seedlings, and legitimate seedlings obtained by artifically crossing and selfing selected trees, are also in progress.

1095. ALIBERT, H. 633.855.34:581.162.3:578.08
Pourquoi et comment on fait la fécondation artificielle sur le palmier à huile.
(**Why and how the artificial fertilization of the oil palm is practised**).
Fm and For., Nigeria 1945 : **6** : 27–30.

The inflorescence and pollen of the oil palm and methods of pollen collection and storage and of artificial pollination are described.

MEDICINAL PLANTS 633.88

1096. SWEN, M. S. D. 633.88:575(51)
Importance of yellow chang-shan and its plan for mass production.
Curr. Sci. 1945 : **14** : p. 334.

A note is given on yellow chang-shan (*Dichroa febrifuga* Lour.), a medicinal plant valuable in the treatment of malaria. A programme of breeding and mass-production of this plant is to be carried out at the Golden-Buddha Mountain Chang-Shan Experimental Station, Szechwen.

1097. PANTULU, J. V. 633.88:576.312.35
Chromosome number in *Cassia sophera* Linn.
Curr. Sci. 1946 : **15** : p. 77.

The chromosome number of *Cassia Sophera* is reported to be $n = 14$. From cytological studies of a number of *Cassia* species and the work of other investigators, the author concludes that the basic chromosome number of the genus *Cassia* is $x = 7$.

1098. GREENWAY, P. J. 633.88:581.6(6)
Empire production of drugs, IV-Strophanthinum.
E. Afr. Agric. J. 1946 : **11** : 184-85.

An account is given of African species of *Strophanthus* reported as having toxic properties. Seeds of the following species resemble those of *S. Kombe*, and have been used as substitutes and adulterants: *S. hispidus*, *S. Courmonti*, *S. Nicholsonii*, *S. gratus*, *S. Eminii* and *S. sarmentosus*. These species are, however, unacceptable according to British Pharmaceutical Standards.

RUBBER PLANTS 633.91

1099. 633.912:575(54.8)
Report of the work of the Rubber Research Board in 1944.
Ceylon, March 1945 : Pp. 31.

From the 12,422 pollinations carried out in 1944 an average fruit set of 1·3% was obtained. The seed showed 83% germination, and approximately 400 seedlings were planted in the nursery. The female parents used included local clones, introduced clones known to be good seed parents, and Prang Besar New Series clones. The pollen parents were mostly trees of PB.86; TKD.113 and PB.5/139 were also used. The latter clone was distinguished by 20·4% successful pollinations.

An experiment has been set up to compare bud grafts from buds on high and low sections of the main stem below the first branch with bud grafts derived from branch buds. Bud grafts obtained from buds low down on the seedling stem tend to resemble seedlings much more than bud grafts taken from the upper portions of the main stem, and selection work may thus be biased.

Observations have been made on clones and seedling families. New trials have been planted. Investigations on quality have been initiated for the purposes of selection work.

FRUITS 634

1100. Siddappa, G. S. and Mustafa, A. M. 634:581.6(54) 635:581.6(54)
Preparation and preservation of fruit and vegetable products.
Misc. Bull. Imp. Coun. Agric. Res., Delhi 1946 : No. 63 : Pp. 24.
Data are included on the suitability of different varieties of fruits and vegetables for canning, juice production, jams, drying and other purposes.

1101. Riche, F. G. H. le 634.42:581.192(68)
Guava varieties in South Africa.
Fmg S. Afr. 1946 : **21** : 9–17.
Data are given on the external characteristics, the ratio of the component fruit parts, and the chemical composition of several guava varieties.

1102. Dodds, K. S. and Pittendrigh, C. S. 634.771:576.356.5:575.12
Genetical and cytological studies of *Musa* VII. Certain aspects of polyploidy.
J. Genet. 1946 : **47** : 162–77.
The various forms of breeding behaviour shown by diploid F_1 hybrids of non-parthenocarpic diploid *Musa* varieties ($2n = 22$) are discussed. When the hybrids were used as female parents and back-crossed, they proved sterile in some instances, produced normal diploid progenies in others, and gave rise to pentaploid progenies in others. In the last-mentioned case, giant embryo-sacs were formed, apparently through double non-reduction; male gametogenesis in these forms was normal.
The factors bringing about these various types of genetical behaviour are discussed.

FORESTRY 634.9

1103. Johnson, L. P. V. 634.972.8:575.12:578.08(71)
Fertilization in *Ulmus* with special reference to hybridization procedure.
Canad. J. Res. 1946 : **24** : Sect. C : 1–3.
Germination tests of fruits obtained from open, self and cross pollination in *Ulmus* indicate a high degree of self-sterility. The practical conclusion is reached that a hybridization technique without emasculation may be recommended for *Ulmus* under certain conditions.

1104. Haque, A. 634.976.26:576.312.35
Chromosome numbers in *Sesbania* spp.
Curr. Sci. 1946 : **15** : p. 78.
The chromosome number of *Sesbania grandiflora* and *S. aculeata* was found to be $2n = 24$, that of *S. aegyptiaca* $2n = 12$.

1105. Sundar Rao, Y. 634.976.26:576.312.35
Chromosome numbers in *Sesbania*.
Curr. Sci. 1946 : **15** : p. 78.
Literature on the chromosome number of species of *Sesbania* is briefly reviewed. The author found the chromosome number of *S. aculeata* and *S. aegyptiaca* to be $n = 6$, that of *S. grandiflora* $n = 12$.

VEGETABLES 635

1106. Hutton, E. M. 635.64(94)
Present and future trends of tomato varieties in Australia.
J. Aust. Inst. Agric. Sci. 1945 : **11** : 128–34.
Old and more recent tomato varieties are discussed. The need for improved varieties is emphasized, and breeding objectives are listed.

1107. Walker, W. F. 635.64:575(94.6)
Tomato production trials and recommendations.
Tasm. J. Agric. 1945 : **16** : 138–43.
A trial of sixteen varieties is reported. A description is given of the new variety, No. 69 Seedling, selected from a cross between Bounty and Potentate made in 1940. It has a dwarf, compact habit, and is very early maturing. The fruits are globular in shape, and free from the stylar scar which often characterizes Bounty.

1108. Cottrell-Dormer, W. 635.64:575.12:578.08
An electric pollinator for tomatoes.
Qd J. Agric. Sci. 1945 : **2** : 157–69.
A description is given of an electrical instrument which can be used for pollinating tomatoes on a large scale. The instrument simulates the behaviour of a native bee (*Anthophora pulchra*), consisting essentially of a fine wire loop which is caused to vibrate within a glass pollen-collecting chamber. It can be used in the field and greenhouse and either as a pollen collector or pollinator, and is not affected by ordinary winds. It is suggested that the instrument should prove valuable in the commercial production of F_1 hybrid seed, and also that it could be easily modified for the pollination of other plants.

1109. Strachan, C. C. and
Atkinson, F. E. 635.64:577.16:575(71)
Ascorbic acid content of tomato varieties and its retention in processed products.
Sci. Agric. 1946 : **26** : 83–94.
The investigations reported include the determination of the ascorbic acid content in canned samples of 31 tomato varieties and strains grown at the Summerland Experimental Station. Sugawara and Clark's Early were found to have consistently good ascorbic acid values and to be suitable for canning. Signet was outstanding in its consistently high ascorbic acid content, but this variety tends to produce small fruit. Fruits of individual plants from crosses of Signet with larger fruited varieties, however, combined high ascorbic acid content with desirable qualities.

1110. Raghavendra Rao, M. R. and
Sreenivasaya, M. 635.65:581.143.7:581.192(54)
Asparagine from Indian pulses.
Curr. Sci. 1946 : **15** : 25–26.
The green gram (*Phaseolus Mungo*), black gram (*P. radiatus*), Bengal gram (*Cicer arietinum*) and horse gram (*Dolichos biflorus*) have been investigated for their capacity to produce asparagine. *P. Mungo* was found to be the richest source of the substance.

1111. Mayo, J. K. 635.655.00.14(66.9+67.11)
Soya beans in Nigeria.
Trop. Agriculture, Trin. 1945 : **22** : 226–29.
This general account of soya bean cultivation includes a summary of the main results of variety trials conducted in the different regions of Nigeria and the Cameroons.

1112. Shorrock, R. W. 635.656(42)
Dried peas.
J. Minist. Agric. 1946 : **52** : 530–34.
A brief account is included of varieties suitable as a dried pea crop and for canning.

1113. Calder, R. A. 635.656(93.1)
Garden pea varieties.
J. Roy. N.Z. Inst. Hort. 1946 : **15** : 19–23.
Notes are given on the different types and varieties of garden pea.

Part II. Foreign.

*STATISTICS 519

1114. Anós, A. 519.24:631.421
Un método gráfico para hallar el número necesario de repeticiones en las experiencias comparativas. (**A graphical method for determining the number of replications necessary in comparative experiments**).
Bol. Inst. Nac. Invest. Agron. Madr., 1945 : No. 13 : 1–16.

"The necessary number of repetitions of the significant production differences in an experiment can be quickly determined by a graphic method, with a nomogram of double alignment representing the equation $\sigma\sqrt{\frac{2}{n}}t = H$ (σ = experimental error, n = number of repetitions, H = significant difference). This result can be reached by adjusting the values of log t by a straight line, $\log t = \frac{a}{v} + b$; v represents the number of degrees of freedom of 't'; this can be done with a relative error of less than 8% by the minimum error method".

1115. Immer, F. R. 519.24:631.421
Some uses of statistical methods in plant breeding.
Biometrics Bull. 1945 : **1** : 13–15, 28.

A review is given of the various methods of field experimentation, ranging from randomized complete blocks and Latin squares to the most complicated lattice designs, applicable to plant breeding trials, with references in each case to the literature wherein the methods are expounded.
J. W.

1116. Wilm, H. G. 519.24:631.421
Notes on analysis of experiments replicated in time.
Biometrics Bull. 1945 : **1** : 16–20.

A description is given of a randomized block experiment with treatments repeated over a number of years, in order to show how the complete analysis of variance should be interpreted in relation to the information required.
J. W.

1117. Schad, C.,
Meneret, G. and
Mayer, R. 519.24:631.421:633.16
Application des méthodes Fisher et Student à la comparaison des variétés en petites parcelles. (**Application of the methods of Fisher and Student for comparing varieties in small plots**).
Ann Phytogénét., Paris 1941 : **7** : 91–107.

The relative value of the statistical methods proposed by Fisher and Student for computing varietal differences in yielding capacity has been analysed from data supplied by malting trials of barleys laid down in Haute-Loire and Clermont-Ferrand.

1118. Upholt, W. M. 519.271.3
Observations on wartime biometrics.
Biometrics Bull. 1945 : **1** : 47–52.

A commentary is presented on the ways in which a biometrician can serve applied biology, fitting his advice to the situation particularly where, as in wartime, rapidity of decision is needed. Special attention is given to size and stratification of samples needed in relation to the question being elucidated.
J. W.

*BREEDING 575

1119. Asmous, V. C. 575:007(47)
Freedom of science in Soviet Union.
Science 1946 : **103** : 281–82.

The author associates himself with Sax's criticisms of the influence of official political philosophy in Russian scientific affairs, in particular with regard to genetics (cf. Abst. 1146 below).

* General studies, see also individual crops.

1120. RIEHM, E. 575:633(43)
Biologische Reichsanstalt für Land- und Forstwirtschaft in Berlin-Dahlem. Wissenschaftlicher Jahresbericht 1939. (**Imperial Biological Institute for Agriculture and Forestry at Berlin-Dahlem. Annual scientific report 1939**).
Mitt. Biol. Reichsanst. Berl. 1941 : No. 63 : Pp. 108.

Wheat
One strain of German winter wheat and four strains of spring wheat have been shown to be resistant to bunt. Grain dormancy and sprouting tendency has been studied in over 200 varieties. Great variation has been shown in the reaction of single varieties of wheat to attack by *Chlorops taeniopus*. Breeding for winter hardiness is in progress. The physiological races of *Puccinia triticina* have been investigated.

Oats
Five lines resistant to loose smut have been discovered.

Barley
Varietal differences in sprouting tendency and resistance to *Helminthosporium gramineum* have been studied. Breeding for winter hardiness is under way. The physiological races of *Puccinia glumarum* have been studied, also varietal resistance to this fungus.

Forage grasses
Breeding for winter hardiness is in progress.

Lupin
Hybridization experiments have been made with sweet lupins and an endemic yellow lupin from southern Portugal which is resistant to mildew.

Serradella
A new strain, Mark II, resistant to *Colletotrichum Trifolii* Bain et Essary has been obtained by selection. Phytogeographical studies have been made of the genus *Ornithopus*, all of whose members so far examined having a chromosome number of $2n = 14$. Experiments to obtain tetraploid lines of serradella by means of colchicine are in progress.

Sugar beet and mangel
Strains with low and high bolting tendencies have been discovered. Varietal differences in dry matter content have been investigated in mangels.

Potato
Breeding for resistance to Colorado beetle is in progress and useful crosses have been effected between cultivated varieties and *Solanum demissum* L. Varietal resistance to wart disease has been studied.
Back-cross selections of *S. demissum* x *S. tuberosum* resistant to *Phytophthora infestans* and yielding up to 75% compared with cultivated varieties have been obtained. The genetics of blight resistance in the W varieties has been studied and it is concluded that the leaf and tuber resistance of these forms depends on the same gene.
W varieties and *S. demissum* x *S. tuberosum* hybrids have been tested for nematode resistance.
Cytological studies of *S. demissum* x *S. tuberosum* progenies have been made.

Flax
The East Prussian physiological races of *Melampsora Lini* var. *liniperda* have been studied. Varietal resistance to this disease is receiving attention.

Apple
Varietal resistance to mildew is being studied.
Hybridization studies involving wild species are in progress. Breeding for winter hardiness is also under way.

Vine
The geographical distribution of physiological races of *Phylloxera* has been investigated, also varietal resistance to this pest and the mode of inheritance of resistance. Hybridization studies continue. Breeding for winter hardiness is in progress.

Elm
The resistance shown by the variety Christine Buisman to Dutch elm disease has been further investigated.

Douglas fir
Notes are presented on the relationship between provenance, especially in North America, and susceptibility to *Phaeocryptopus Gaeumanni* (Rohde) Petr.

Cucumber
Breeding for resistance to *Corynespora* is in progress.

Bean
Varietal resistance to *Phytomonas medicaginis* var. *phaseolicola* is being investigated.

1121. 575:633(44)
Rapport sommaire sur les travaux poursuivis en 1940 par les stations d'amélioration des plantes. (**Report summarizing the work carried out in 1940 by the plant breeding stations**).
Ann. Phytogénét., Paris **1941** : **7** : 143–56.

Wheat
Eleven varieties have been added to the Catalogue of Species and Varieties, viz. Précoce de Juillet, Kirand, Jade, Noël, Blé des Dômes, Bellevue, Epidor, Druchamp, Flandres-Desprez, Président Riverain and Hybride de la Cloqueterie. A new variety from Vilmorin 23 x Garnet has given promising yields in the Parisian zone. The variety Blé des Dômes (C.F.1), from K8 x Szekacs, is an early wheat resistant to cold and rust.

Oats
The variety Souveraine (Sovereign), derived from Grise d'Hiver, has been added to the Catalogue of Species and Varieties. Breeding work is in progress to counter susceptibility to cold and *Ustilago Avenae.*

Barley
Three new varieties have been admitted to the Catalogue of Species and Varieties, viz. René Guillemart, a selection of Maja, and Trésor du Velay and Orge du Ronzet, both selections of Orge du Puy. Trésor du Velay is adapted to the conditions obtaining in the basaltic plateau of Puy-de-Dôme, while Orge du Ronzet should be of value in the submontane regions of the same department. Breeding is also in progress with winter barley, and attention is being given to malting quality.

Potato
Breeding for resistance to wart disease, blight and leaf-roll continues.

Flax
Varietal resistance to *Colletotrichum Lini* has been observed. Information is also given on the fibre quality of French varieties.

Oil Plants
The varietal resistance of colza and rape to cold has been studied. Tetraploid colza lines have exhibited increased yields over the corresponding diploids. Methyl methylanthranilate and methylnitroxylene have proved successful as colchicine substitutes for the induction of polyploidy

Peach
Information has been collected on the resistance to cold and disease, yield and degree of self-compatibility of French varieties.

Soya bean
Yield and quality trials are reported.

1122. * 575:633(48.9)
25 aar i planteforaedlingens tjeneste. (**25 years in the service of plant breeding**).
Pajbjergfondens Foraedlingsvirksomhed, Børkop **1945** : Pp. 46. illus.
The history and the development of the work carried out under the administration of the Pajbjerg Fund in Denmark are described and thanks are expressed for additional financial and other support from various industrial concerns for co-operation in lupin breeding, tests of baking quality, etc.
Methods of breeding are outlined in some detail with notes on a time-saving modification adopted

* An extended summary of this paper is on file at the Bureau.

in crossing self-pollinated plants and on factors affecting the reliability of family selection by progeny testing in working with cross-pollinated plants.
The creation and the size of plant material for family selection and progeny testing and the way in which the judging of the plants of root crops, grasses, clovers, rye and maize is conducted, and the stage at which such determination are made are also discussed. The best methods of multiplying up the strains finally chosen and of raising the seed for selection are considered together with observations on the various procedures which may be adopted in family selection.
The greater part of the publication is concerned with early and recent work by the Pajbjerg Foundation on the breeding of various crop plants listed below, and concludes with an article on statistical and other sources of error in selection and breeding operations.

Winter wheat
In 1944 a segregate, Konge II (King II), from the Danish wheat Ideal, was released; it is a short strawed type and, in average winters, one of the most productive varieties grown in the country. From numerous crosses between Danish and foreign wheats only a few lines of Konge x Garton's Little Tich were saved after the winter of 1941–42. Further work with these lines and new crosses is in progress.
The Pajbjerg Foundation did a considerable amount of hybridization work, crossing its own winter strains and foreign strains of winter and of spring wheat, including the crosses Pajbjerg Ideal x Ceres spring wheat, Pajbjerg Invicta x Ceres spring wheat and Pajbjerg Invicta x Marquis spring wheat: Only the first proved of importance for breeding. Selection resulted in four lines of special interest, Nos 24/6, 24/9, 27/9 and 60/30. Other lines of potential value were derived from strains 17 and 46; the latter showed quite good yields and baking quality, but suffered slightly more than the rest in 1944 from eye spot (*Cercosporella herpotrichoides*). Further crosses to improve the above material were made later, e.g. by crossing the hybrid of Ideal x Ceres with Konge II, Skandia II, Konge II x Ideal, Gluten, Joncquois, Jubilee, Progress, etc. The backcrosses to Konge have resulted in a considerable advance.

Oats
The early material included the Grey oat. Later, hybrids from Hede x Sejr were included. After 1930 numerous varietal crosses were made, the most intensively studied being Sejr x Gopher and Örn x Mansholt Binder. The latter cross gave specially good types.

Barley
Barley breeding, which is of recent date, began with a pure culture of Abed Maja in which long strawed types subsequently arose. Following trials of normal and long strawed types, one normal type strain (No. 8) has done well in annual and other trials in yield of grain and straw.
In recent years hybridization has been carried out and many lines are very promising.

Fodder plants
In general breeding has been on a moderate scale, as so many varieties exist, and very large numbers remain to be tested. Some particulars are given on the work on cocksfoot, timothy, perennial rye grass, meadow fescue, lucerne and clover. Among the successful clover strains is Pajbjerg II derived from a Swedish local strain Østra Karaby and from Øtofte Medium Late; its resistance to rot (*Sclerotinia Trifoliorum*) and clover eelworm is such that there are grounds for thinking that natural selection has been effective among the various families used in the breeding operations.

Lupin
A fodder lupin for protein and an oil lupin were the two objectives for this crop. Rapid and simple methods of determining the content of bitter substance and fat had to be found. The Russian methods were adopted. A large collection of cultivated and wild species was made, comprising a couple of samples of Russian and Polish yellow lupins and blue lupin from Germany, all three containing no alkaloids. Also, among 158,000 seeds of ordinary bitter lupin, a few alkaloid-free seeds were found, namely one of white lupin, one of *Lupinus mutabilis* and one of yellow lupin. Only from the last was a mature plant obtained.
The next step was to cross these alkaloid-free plants with others from the collection to obtain a greater variety of alkaloid-free plants for selection. Interspecific crosses failed.
Yellow and blue lupins were used in the initial stages of the work, but in 1938 crosses were made between a white-seeded white-flowered, bitter, blue lupin and an alkaloid-free German lupin, and in 1939 between white-seeded types of the Reform lupin and alkaloid-free lines of yellow lupin. These white-seeded forms are specially intended for human consumption.

The F_1 was invariably bitter, and was followed by an approximately 3 : 1 segregation in the F_2. The alkaloid-free quarter only was retained and was harvested separately to obtain a large number of lines for multiplication and trials. Many practical difficulties were encountered in these operations, especially from pest damage to blue lupins.

Some lines of blue and yellow lupin have reached the stage for the raising of pure cultures. Some of the F_2 lines themselves are so valuable that they can be put out for general cultivation.

In the blue lupin, used only in the ripe stage, definite variation in earliness, height, growth period, etc. has been noted. Leaf colour exhibits three main types, dark green, light green and red, of which only the first-named is of value.

The yellow lupin, which is used for green fodder and also in the ripe stage, shows much less variation in yield and other features. No differences in the tendency of the pods to burst was noted. Some variation was, however, noted in seed yield and abundance of foliage.

To obtain greater variation in the yellow lupin, a collection should be made of wild plants from the regions where lupins are indigenous and the diversity of forms probably very great, for ultimate hybridization with Danish material, to obtain a combination of desirable characters in the progeny.

The problem of possible causes of the increase observed in the number of bitter seeds found among yellow lupin varieties put on the market and even among families raised from the alkaloid-free portion of the F_2 and isolated to prevent hybridization in the breeding plots, is considered.

Cross-pollination, especially in the yellow lupin, is suggested as the cause of this adulteration, and a further source of danger lies in the fact that different varieties of lupin, poor in alkaloids, differ in the genetic basis for low alkaloid content; on inter-crossing they may give progeny with a high content of bitter substance. Hence contamination by admixture followed by crossing between it and the original stand may lead to serious adulteration of the alkaloid-free crop. The mixing of consignments of alkaloid-free lupin for sowing should therefore be prohibited. In breeding material, however, the possibility of admixture of seed is excluded, and the chance of hybridization occurring between families differing in their genetic basis for low alkaloid content is slight.

The great rise in bitter seeds in 1940–41 might have been partly due to the fact that the bitter seeds present withstood fungous attack during storage better than the rest of the seed and germinated better.

The measures discussed for preventing an increase in the production of bitter seed in yellow lupins include the use of really pure "original" seed combined with carefully controlled breeding of élite and "original" seed, both seed and plants in the field being investigated. A table is given showing the different combinations of the staminate and pistillate parents that produce phenotypically and genotypically bitter or alkaloid-free types. To ensure complete absence of the defect, bitter lupin plants must be removed from the field before flowering. Alkaloid-free plants with a single factor for this condition may be detected in the following year through their hybrids and can then be eliminated.

The fat content of blue and yellow lupins was too low to be worth extraction, whereas white lupins and *L. mutabilis* contained about 12–14% and 16–19% respectively and showed great variation in this feature. The breeders' aim was to obtain forms which had a high fat content and would mature under Danish conditions. Difficulties of cultivation, owing to weather conditions, were encountered. Initial material with greater variation might, it is thought, be obtained by collecting seed from the native habitats of the various species and thence producing seed suitable to Danish latitudes.

In the meantime by artificial cultivation in a greenhouse it was found that a mature crop of lupin could be obtained in winter, this making it possible to take two crops per year.

Root crops

In 1939 experiments were made on crosses between (1) the sugar mangel, Pajbjerg Alfa, and the yellow-fleshed turnip Gartons Golden Tankard; (2) various Pajbjerg strains of fodder beet; and (3) various more distant forms such as red beet x sugar beet and Barres x *Beta maritima*.

Marked heterosis was evident in most of the hybrid material cases, but not in Barres x Barres.

The general results of this hybridization work at the official experimental stations are shown in coloured plates and tables, as an indication of how hybridization can be used to raise the dry matter content and yield of new Danish beet strains, while retaining much of the desirable shape and smoothness of Barres.

A very brief note is also given on the work done on *Brassica Napus* var. *rapifera*. In the last few years numerous crosses have been made between Danish strains *inter se* and with foreign strains. The trial of the resulting material has been begun.

1123. 575:633(49.2)

Zeventiende beschrijvende rassenlijst voor landbouwgewassen. (**17th descriptive variety list for agricultural plants**).
Inst. Plantenveredeling, Wageningen 1941 : Pp. 271.

Achttiende beschrijvende rassenlijst voor landbouwgewassen. (**18th descriptive variety list for agricultural plants**).
Ibid. 1942 : Pp. 264.

Two further issues (cf. *Plant Breeding Abstracts*, Vol. X, Abst. 671) of this valuable manual for breeders and growers of economic plants have now been issued. The death of Prof. C. Broekema is recorded with regret.
The compilation of the list has now passed into the hands of Prof. J. C. Dorst of the Plant Breeding Institute at Wageningen. The same general formation has been retained and the usual full and detailed information on varieties available in Holland is set out together with particulars of relevant regulations and orders for the information of growers and breeders.

1124. 575:633(49.4)

Annales agricoles Vaudoises. 22me année. (**Agricultural annals of Vaud. 22nd year**).
Lausanne, 1945 : Pp. 155.

This number is devoted mainly to a review of the work of the Ecole Cantonale Vaudoise d'Agriculture during the past 75 years. It includes also an elementary account of Mendelian principles, a discussion of the importance of stocks in fruit tree improvement, and a useful account of the history of wheat breeding in Switzerland, in particular at the Monte-Calme Experimental Station. The genetic origins of the more important Swiss wheat varieties are given.

1125. 575:633(73)

Report of the Administrator of Agricultural Research, 1944.
U.S. Dep. Agric., Agric. Res. Admin. Wash. 1944 : Pp. 234.

Progress for the fiscal year ended June 30, 1944 is reported for the different Agricultural Bureaux. Work of interest to plant breeders reported in the various sections has been largely dealt with in the summaries of the annual reports of the agricultural experiment stations, the station bulletins, and other sources of information. Recent major achievements in plant breeding include the development of hybrid maize for regions outside the Corn Belt, particularly in the South, the production of F_1 hybrid onions and lucerne, and the breeding of wheat varieties resistant to Hessian fly and diseases.

1126. 575:633(73)

Report of the Administrator of Agricultural Research, 1945.
U.S. Dep. Agric., Agric. Res. Admin. Wash. 1945 : Pp. 238.

Progress for the fiscal year ended June 30, 1945 is reported for the various bureaux. Investigations of interest to plant breeders have largely been covered in the abstracts of the annual reports of the experimental stations and various other sources of information.

1127. 575:633(74.2)

Agricultural research in New Hampshire.
Rep. Dir. N.H. Agric. Exp. Sta. 1943 : Bull. No. 351 : Pp. 66.

Rubus

Seedlings from crosses between varieties of raspberry, blackberry and several other species of *Rubus* have been planted.

Strawberry

Hybrid selections have been obtained. Crosses involving Pathfinder gave the highest percentage of promising seedlings.

Cucurbita

Colchicine-induced tetraploid plants obtained from crosses between the Buttercup variety of *Cucurbita maxima* and the African Bell variety of *C. moschata* produced no viable seeds, although diploid forms of the same cross yielded good seed. Diploids of the cross between Buttercup and the Butternut variety of *C. moschata*, however, produced no viable seeds.

The production of pure lines of early musk-melons with perfect flowers is in progress. Musk-melon breeding for resistance to powdery mildew is reported.
The new water-melon, White Mountain, has been introduced for trial. It is characterized by small fruits, each weighing about 3 lbs., extreme earliness, high quality and a thin rind.

Tomato
Hybrids between commercial varieties and late blight resistant strains of *Lycopersicon hirsutum* are under investigation. Some crosses between commercial varieties and Plant Industry No. 126923 are giving progeny which are indeterminate in plant habit and extremely early in maturity.

Bean
Two new varieties, Brilliant and Flash, have been developed and distributed for trial. They are characterized by highly coloured pods and seeds. A small-podded, white-seeded green bean, which may be suitable for canning whole, was also distributed for trial.

1128. 575:633(74.2)

Agricultural research in New Hampshire.
Rep. Dir. N.H. Agric. Exp. Sta. 1944 : Bull. No. 354 : Pp. 68.

Forage crops
Improvement of timothy, Ladino clover and red clover is reported.

Pepper
A medium-early variety, named Merrimack Wonder, has been derived from a single plant selection of Charter Oak. It produces good quality peppers in years when most other varieties fail to set fruit. A colchicine-induced tetraploid form of California Wonder is under investigation. The fruits are very large and early.

Fruit
Crosses have been made between the apple varieties McIntosh and Winter Banana and between Macoun and Northern Spy, with the object of producing high quality, late maturing varieties for winter use.
Crosses are reported between the pear varieties, Clapp's Favourite and Conference.
Peach crosses have been effected between cultivated varieties and North Caucasian types.

Almond
Hybrids between *Amydalus nana*, the Siberian almond, and Californian almond varieties have been obtained.

Rubus
Breeding work with raspberries and blackberries and related species is being continued. Crosses have been made between the wild thornless blackberry (*R. canadensis*) and cultivated varieties in an attempt to develop hardy thornless types. The hybrids also include crosses of the flowering raspberry, *R. odoratus*, with both blackberries and raspberries. In addition, seedlings are being grown with the purpose of producing hardier red raspberries and a suitable early ever-bearing raspberry.

Blueberry
Hybrids between selected wild low bush types and a cultivated high bush variety are now under cultivation.

Strawberry
Wild types and hybrids between the native wild species (*Fragaria virginiana*) and cultivated varieties showed considerably greater winter hardiness than cultivated varieties and their hybrids.

Cucurbits
Work is in progress to develop a water-melon of the White Mountain type (cf. Abst. 1127 above) with black instead of brown seeds and fewer seeds. Extremely early musk-melons of high quality are ready for distribution for trial; these are either of the Honey Rock type or a type characterized by perfect flowers.

Tomato
Breeding work aims at the production of extremely early maturing varieties for the cooler parts of New Hampshire. Strains from crosses between Early Chatham and certain South American

species exhibiting extreme earliness are under test. Another breeding objective is the development of tomatoes with high vitamin C content and commercial fruit size, from hybrids involving *L. peruvianum*. Two new varieties have been named, Window Box and Tiny Tim. Window Box is characterized by extreme earliness, dwarf, determinate habit, and standard fruit size. Tiny Tim is a very small-fruited type, capable of maturing in a 5-inch pot. It is recommended for indoor decorative purposes.

Beans
Breeding is in progress to develop Lima bean varieties which will grow satisfactorily under cool weather conditions. Some of the selections obtained are earlier and higher yielding than Henderson's Bush.

1129. 575:633(74.4)

Annual Report of the Massachusetts Agricultural Experiment Station for the fiscal year ending June 30, 1945 : Bull. No. 428 : Pp. 71.

Maize
Hybrid production is in progress.

Forage crops
The Finnish late hay strain of cocksfoot shows promising winter hardiness. The strain is to be improved by "strain-building".

Tobacco
New black root rot resistant strains showing improvements in type, quality and growth habits in comparison with Havana Seed 211 are under commercial test.

Pepper
Promising sweet pepper selections showing resistance to tobacco mosaic have been obtained.

Onion
Seeds from crosses between *A. fistulosum* and *A. Cepa* were treated with colchicine. Most of the seeds soaked 3–5 days in 0·1% solution produced seedlings with thickened cotyledons and primary roots; the leaves and subsequent adventitious roots were however normal. No tetraploids were observed among the mature plants.

Asparagus
The improvement of yield and uniformity is in progress.

Squash
Breeding work has been begun to produce a high-yielding Butternut squash (*C. moschata*).

Cucumber
The production of hybrids from inbred lines is receiving attention.

Tomato
In breeding for resistance to all local races of *Cladosporium* leaf mould, the most promising material has been obtained from hybrids involving the wild type No. 129882 from Peru and commercial varieties such a Bay State and Waltham Forcing.
No. A–13, a selection from the cross Allred x Rutgers, has been sent out for trial in several states; it has given a particularly good performance in Maine. The selection has been back-crossed to Rutgers to improve its size and firmness.
Selections from crosses of Trellis No. 22 with Early Rutgers and Marglobe show superiority over Trellis No. 22 in both total and early yield. A selection from a cross between Trellis No. 22 and Baltimore had only 1·8% cracked fruits in comparison with the 33% shown by Trellis No. 22.

Sweet corn
The new inbred, Massachusetts No. 8, is to be increased for production. It resembles Purdue 39, but is earlier maturing and has a larger cob and stiffer stalk.

1130. 575:633(74.7)

Sixty-Third Annual Report of the New York State Agricultural Experiment Station Geneva, N.Y. for the year ended June 30, 1944 : Pp. 62.

Hops
Introduced varieties are under test for resistance to diseases and insects. Several seedlings developed at the New York State Experimental Station show considerable resistance to both downy and powdery mildew.

Fruit
Breeding in various kinds of fruit is in progress. Particular attention is being given to the production of a high quality late commercial apple.

Cabbage
The breeding of Danish and kraut types resistant to yellows is in progress.

Cucurbita
The Japanese Pie and Quaker Pie varieties of *Cucurbita moschata* have been found to show heritable tolerance to mosaic. The two varieties were crossed with varieties of *C. Pepo* and *C. maxima*, and the results of a breeding programme in which this material was used are reported. It was concluded that crossing of mosaic susceptible and resistant varieties followed by rigorous selection and intensive inbreeding may be expected to produce promising mosaic tolerant types. It is also interesting to note that the F_1 hybrids of Japanese Pie x Flat White Boer (*C. maxima*) and Quaker Pie x Flat White Boer were almost completely sterile. The few F_2 plants obtained were weak and produced no viable seed.
The breeding programme to develop a canning squash intermediate in consistency between Golden Delicious and Boston Marrow has resulted in the production of four promising lines; a number of thick-fleshed market types have also been secured. Improvement of Boston Marrow by selfing and by intervarietal hybridization is also reported. Selection of commercial lines of Delicata has resulted in an improved type, named Geneva Delicata. This new type is superior in flavour to Table Queen and has a thicker and less stringy flesh.

Tomato
Promising new earlier selections have been obtained. Breeding involving tomatoes of the Italian type is reported.

Pea
Marked differences in response to seed treatment have been observed between varieties and between stocks of a single variety. The differences were associated with seed vitality or seedling vigour.

1131. 575:633(74.7)

Sixty-fourth Annual Report of the New York State Agricultural Experiment Station, for the year ended June 30, 1945 : Pp. 74.

Fruit
Over 90 apple seedlings and varieties have been tested for vitamin C content. The vitamin C content ranged from less than 2 to 40 mg. per 100 grm.
New seedlings of apple, pear, peach, plum, grape and other fruits are under test. Vitamin C content, and suitability for processing and other purposes are receiving special attention.
Observations have been made on the susceptibility of grape varieties to black rot, downy mildew and powdery mildew.

Cabbage
Selection for yellows resistance is in progress.

Musk-melon
Breeding for mosaic resistance is reported.

Sweet corn
Work has been begun on the production of an early hybrid suitable for canning and on the production of a non-tillering hybrid suitable for machine harvesting and equal to Golden Cross in quality and other respects.

1132. 575:633(74.8)

Science for the farmer.
58th Rep. Pa Agric. Exp. Sta. 1945 : Bull. No. 475 : Pp. 48.

Pepper (*Capsicum annuum*)
High-yielding lines with thick-walled, broad fruit have been selected from a cross between California Wonder and Harris Earliest. These lines appear to be superior to the varieties at present available. The commercial possibility of using F_1 hybrid seed is being studied.

Lettuce
Progress in developing a selection of Great Lakes showing improved uniformity of plant habit and heading is reported.

Tomato
The commercial possibility of using F_1 hybrid seed is under investigation. The F_1 hybrids 9–44 and 10–44 appear to be promising for the early market and canning industries respectively.

1133. Orton, C. R. 575:633(75.4)
Farm science looks ahead.
Bienn. Rep. W. Va Agric. Exp. Sta. 1942–44 (1944) : No. 317 : Pp. 56.

Maize
New hybrids have been released.

Forage crops
Selected strains of bluegrass are under observation. Selection for resistance to stripe smut is reported.

Apple
Varietal differences in the vitamin C content of the freshly harvested fruit are reported. Rome Beauty and York Imperial were the only varieties which did not show a marked loss of vitamin C when stored at 36–40° F. for periods of 3 to 30 days.

Blueberry
Breeding is in progress.

Sweet corn
Single cross hybrids are under test; the aim of breeding work is the production of several varieties which can be planted at the same time and yield corn of superior quality throughout the season.

1134. 575:633(75.6)
Fifty-sixth Annual Report of the South Carolina Experiment Station of Clemson Agricultural College, for the year ended June 30, 1943 (1944) : Pp. 173.

Turnip
Shogoin and Purple Top White Globe have been crossed in an attempt to combine the root characteristics of the latter variety with the aphid resistance of the former.

Sweet potato
Strains of the Porto Rico sweet potato have been tested.

Cotton
Sea Island x Upland hybrids have been back-crossed to Upland. Some of the types obtained give high yields of good, fairly fluffy bolls; the fibre is hard and strong, with the appearance of Sea Island fibre, but the staple length is somewhat shorter than that of Sea Island.
Breeding for extra long staple in Upland cottons has consisted of line selection in the longer staple varieties, followed by intervarietal hybridization.
The problem of securing desirable combinations of several characters in intervarietal and interspecific hybrids is discussed. Valuable combinations of characters have been derived from the crosses Wilds x Tidewater and Wilds x Meade.
Data are given on the performance of Ewing Long Staple selections, Wilds selections and the Upland hybrid lines.
In breeding Sea Island cottons, high yields have been given by the promising hybrid strains, Westberry x Seabrook and (Westberry x Seabrook) x (Puerto Rican x Bleak Hall). The two strains, designated TZ and TZRV respectively, are early maturing.
Trials of wilt resistant strains and varieties are reported.

Pepper
In the programme of pepper improvement, selection of the Japanese and Cayenne types is being carried out. The promising Japanese strains show more uniformity of plant characters than the Cayenne selections. The Yatsuffa strain is the most promising; it produces large erect pods borne in clusters. On account of the high proportion of seed to pod, however, this strain does not possess the desired red colour when dried and ground.
Progress has been made in the production of pure lines of paprika varieties; uniform strains of Carolina No. 7 are now available. Selection in the F_2 of numerous crosses is reported.

Cabbage
Round-headed selections of Charleston Wakefield have been developed.

Lettuce
Promising mosaic resistant hybrids have been obtained.

Water-melon
A trial of *Fusarium* wilt resistant varieties is reported.

Cucumber
Promising downy mildew resistant selections have been produced by crossing the mildew resistant varieties, Puerto Rico and China, with the two commercial varieties, A and C, and Colorado. These selections are high yielding, with desirable fruit shape and colour.

Beans
Snap bean hybrids exhibiting mosaic and powdery mildew resistance are under test. Some of these hybrids are more productive than the commercial varieties under conditions of high temperature.

1135. 575:633(75.7)

Fifty-Seventh Annual Report, of the South Carolina Experiment Station of Clemson Agricultural College for the year ended June 30, 1944 (1945) : Pp. 154.

Cotton
Lines with strong, long fibres have been obtained from Sea Island x Upland hybrids back-crossed to Upland. Strains 341, 391 and 394, all derived from hybrids of Seabrook x Wilds back-crossed to Wilds, are described as particularly promising. Strain 394 is fairly resistance to *Fusarium* wilt. Strain 542, the interspecific hybrid line with the greatest fibre strength, has been produced from a Bleak Hall (Sea Island) x Wilds hybrid back-crossed to Wilds. Strain 400 from this cross has shown promising wilt resistance. Three sister lines selected from Ewing Long Staple (D and PL 37–45) show considerable earliness and productivity. It is hoped to transmit the wilt resistance of strains 394 and 400 to lines with more desirable plant and boll characters. Promising F_1 progeny have already been obtained from crosses between these hybrids and other interspecific back-cross lines.
The two new Sea Island strains developed from Seaberry have given good yields. One strain is a small leaf or light foliage type, the other the normal leaf type. Both strains are early maturing and give high yields of good bolls. Further selection is, however, required to improve the fibre strength of Seaberry. A strain from the double cross (Westberry x Seabrook) x (Bleak Hall x Puerto Rican), temporarily designated TZRV, produces a finer and stronger fibre than Seaberry, but is less productive and has smaller bolls. Two lines from the hybrids Gaddis x Montserrat and Concord x Gaddis also appear to be promising.

Peach
The vitamin C and carotenoid contents of several varieties have been determined before and after canning.

Bean
The new snap bean variety Cherokee Wax has been developed from a wax-podded selection of Asgrow Black Valentine. It resembles Valentine except in pod colour and its greater productivity. The new variety sets pods under conditions of unusually high temperature. One line of the hybrid progeny No. 1187 shows particular promise. It is an early black-seeded bean, producing high yields of pods free from fibre, and is resistant to both mildew and mosaic. Selection for mildew and mosaic resistance and the capacity to form pods under adverse climatic conditions is in progress in several hybrid progenies.
Cherokee Wax has been crossed with some of these hybrids, and wax and green podded progenies showing good quality and disease resistance have resulted.

1136. 575:633(75.8)

Fifty-fifth Annual Report of the Georgia Experiment Station for the year 1942–43. Pp. 75.

Wheat
Hybrids under test include crosses of promising disease resistant wheats with the leaf rust resistant Sandford variety.

Oats
Data are given on the varieties recently developed from crosses of Lee x Victoria, viz. Lega, Lelate, Leroy and Lelina.

Cotton
The Empire variety has shown considerable thrips resistance. Breeding for wilt and root knot resistance is reported. The variety Coker 4 in 1 is a valuable parent in breeding for a combination of wilt and root knot resistance.

Capsicum annuum
The new variety Truhart Perfection has been selected from Perfection (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 872).

Peanut
Marked differences have been observed in varietal response to fertilizers, limestone and gypsum. Hybridization and selection are in progress.

Cantaloupe
Crosses were made between a wild inedible type, resistant to both downy and powdery mildew, and high quality commercial varieties. Several seedlings selected from back-crosses of these hybrids show high quality and promising resistance to both mildews.

Water-melon
S87, a selection from a cross between Cuban Queen and an early strain of Iowa Belle, has been named Georgia Wilt Resistant. This variety is resistant but not immune to wilt, and is similar in type to Stone Mountain. The rind is sufficiently tough for shipping, and the quality of the flesh equals that of Cuban Queen or Stone Mountain. Strain X32 continues to show more wilt and anthracnose resistance than other selections. The breeding of a small, easily handled wilt resistant melon is receiving attention.

Tomato
Breeding for resistance to both root knot caused by nematode and *Fusarium* wilt is reported. Strains of *L. pimpinellifolium* and hybrids between this species and *L. esculentum* varieties were more or less resistant to both diseases. The Panamerica variety whose parentage is *L. pimpinellifolium* x Marglobe appears to be outstanding in wilt resistance, and slightly tolerant to nematode.

Soya bean
The new forage variety Gatan has been developed from a natural hybrid of Otootan. It produces good yields of both hay and seed.

1137. 575:633(77.2)
Science solves farm problems and aids agricultural production.
56th Rep. Dir. Purdue Univ. Ind. Agric. Exp. Sta. 1943 : Pp. 121.

Wheat
At least seven physiological races of smut have been identified. Two races have been found which attack the resistant variety Kanred-Gipsy. Trumbull, Hussar and Nabab are susceptible to at least one race. Kawvale and Hope-Hussar have so far exhibited resistance to all races with which they have been inoculated. Crosses have been made between Trumbull and Kawvale or Hope-Hussar.
In breeding for bunt resistance, bunt resistant varieties have been crossed with adapted wheats. Breeding for Hessian fly resistance is in progress.

Maize
Genetic differences in the oil and protein content of single cross hybrids are reported. No significant differences have been found in the chemical composition of the grain from hybrid and open-pollinated varieties of dent maize.
Hybrids have shown differences in susceptibility to the corn borer.
The new dent hybrids Ind.418 [(WF9 x M14) x (CC7 x R4)] and Ind. 620 [WF9 x M14) x (Os 420 x Hy)] have been released. They are high-yielding, early and resistant to lodging.
The resistance to *Helminthosporium carbonum* of the inbred Hy has been transferred to the inbred Pr. Experiments have shown that Hy and the resistant Pr can be crossed without loss of hybrid vigour in the single cross.

Potato
Varietal tests of quality are reported. Sequoia ranked highest for mealiness. Selection for scab resistance is in progress.

Plum
Grand Duke, French Damson and Stanley have shown resistance to internal breakdown and fruit crack.

Musk-melon
High-yielding strains resistant to *Macrosporium* leaf spot have been obtained.

Water-melon
Hybrids between the wilt-resistant variety Hawkesbury and susceptible varieties with superior quality are being selected.

Tomato
Certain strains of *L. peruvianum* and *L. pimpinellifolium* have been found to be much richer in vitamin C than the commercial varieties. Certain hybrids from crosses between *L. hirsutum* and the cultivated tomato contained several times more provitamin A than the commercial varieties. Crossing between strains with high vitamin content and commercial varieties is in progress.
Promising strains showing resistance to *Septoria* leaf blight have been developed from crosses of Baltimore and Rutgers with *L. hirsutum.*
F_2 hybrids of the cultivated tomato have been selected for several characters.

Soya bean
The new variety, Earlyana, has been released (cf. Abst. 1451 below).

Sweet corn and popcorn
Sweet corn and popcorn inbreds and hybrids are under test for earworm resistance. Over 30 sweet corn inbreds have been graded as relatively resistant to the corn-borer.
A new selection of the sweet corn inbred, Purdue 39, gives promising results when substituted for the original Purdue 39 in the hybrid, Golden Cross Bantam. The new line, designated Purdue 39A, has a darker green leaf and an increased kernel number.
New popcorn hybrids of the South American type have been produced. They are superior in yielding capacity, tenderness and popping expansion to the open-pollinated South American varieties. In general F_1 hybrids possess greater popping expansion than either inbred parent.

Mentha
Breeding work aims at developing disease resistant peppermints and disease resistant mint strains for menthol production. A self-fertile peppermint, presumed to be polyploid, has been produced by treating the highly sterile common black peppermint with colchicine. This form is also fertile in crosses with two species of spearmint and with the Japanese mint (*Mentha arvensis* var. *piperascens*).

Pyrethrum
Selection is reported.

1138. Miller, M. F.,
Shirky, S. B. and
L'Hote, H. J. 575:633(77.8)
Investigations for the benefit of the Missouri farmer. Work of the Agricultural Experiment Station during the year ending June 30, 1944.
Bull. Mo. Agric. Exp. Sta. 1945 : No. 491 : Pp. 71.

Wheat
A 42-chromosome wheat showing chromosome homology with *T. vulgare* was synthesized from the cross *T. dicoccoides* x *Aegilops squarrosa*, followed by chromosome doubling. The genome distinguishing the common 14-chromosome wheats from the common 21-chromosome wheats was then identified, and the systematic transfer of genes and chromosomes between species of these two groups was made possible. Strains with chromosome deficiencies are now being used in an extensive study aiming at the location and recombination of factors for stem rust and Hessian fly resistance.
Hybridization work is in progress to combine high yielding capacity, earliness, and milling and baking quality. A number of selections from crosses involving Clarkan, Missouri Early Premium and similar varieties exhibited promising yield, quality and smut resistance.
Varieties of soft red winter wheat were tested for their suitability as cake flours. Missouri Early Premium and Clarkan ranked high in quality. Kawvale was found to be unsuitable for cake flours.

Oats
The development of smut and rust resistant strains possessing the yielding capacity of Columbia is in progress. In tests of varieties and many hybrids, the Columbia x (Victoria x Richland)

selections were highly productive and resistant to smut and stem and crown rust; the Columbia x Navarro selections resembled Columbia in agronomic qualities and were also smut resistant.

Maize

Promising new white double hybrids are under test. A strain producing haploids at about 20 times the usual rate has been identified, which provided material for investigations on methods of haploid induction.

Barley

Superior hybrid selections have been obtained. Selection for loose smut resistance is reported.

Cotton

Advanced generation strains were selected from the following crosses: Delfos 719 x Stoneville "b", Delfos 719 x Deltapine 11A, Ambassador x Deltapine 11A and Deltapine 11A x Stoneville 2B.

Tomato

Lycopersicon pimpinellifolium has been used as a source of resistance to leaf mould and *Fusarium* wilt. *L. pimpinellifolium* has so far proved to be resistant to all the different strains of leaf mould collected. The pathogenicity of a new race of *Fusarium* wilt from Ohio has been studied. The factor for resistance to the usual *Fusarium* races and one or more additional factors are believed to determine resistance to the Ohio strain.

Peas and beans

The cooking qualities and palatability of 11 garden and two field varieties of soya bean have been investigated. The following varieties were graded as good: Aoda, Bansei, Funk Delicious, Higan, Imperial Rokusun and 81044-Select.

The strains S.55-10 and S.55-12 were outstanding in hay and grain production. The early variety Lincoln (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 537) was crossed with several other varieties with the object of developing a high-yielding early strain for processing.

1139. 575:633(79.6)

Wartime agricultural research.

51st Rep. Idaho Agric. Exp. Sta. 1944 : Bull. No. 255 : Pp. 63.

Wheat

Spring wheats have shown less resistance to black stem rust than winter varieties. The hard red spring wheat, Premier, has been crossed with Idaed, Federation and Australian 735. F_4 and F_5 rust resistant selections characterized by absence of awns, short straw, white kernels, and hard or semi-hard grain have been secured. Attempts to isolate soft strains are being made by back-crossing F_4 lines to the soft white parents.

The problem of dwarf smut resistance is receiving attention at the High Altitude Branch Station; Ridit x Relief (C.I. No. 11925) and Ridit x Utah Kanred were free from dwarf smut when grown in the winter wheat nursery.

Oats

At the Aberdeen Branch Station the new selection C.I.4136 from the cross (Victoria x Richland) x Bannock shows promise as a high-yielding variety with shorter straw and more resistance to lodging than the standard varieties. It also shows smut resistance and some stem rust resistance.

Barley

The high-yielding selections, Ab. 36–6127 and Ab. 36–5652, show promise of being superior to Trebi and Velvon. They also exhibit improvement in straw strength.

Potato

Selection of seedlings for resistance to virus diseases is reported.

Apple

The new varieties Idagold and Payette, derived from crosses between Wagener and Spitzenburgh and between Ben Davis and Wagener, respectively, have been released for trial. Idagold is recommended primarily for the home orchard. The fruits are large, and a clean bright yellow colour when fully ripe. They are suitable for dessert and cooking purposes, and store well, showing no tendency to shrivel. Payette is a large dark red apple with good dessert quality. In cold storage it retains its high quality until April or longer.

Tomato

Hybrids from a cross between Marglobe and the curly top resistant species, *Lycopersicon chilense*, and back-crosses of these hybrids to commercial varieties are being selected.

Bean
Hybrid selections involving Pinto exhibit resistance to curly top and common bean mosaic; the selections are to be further tested. Promising selections of the green pod and wax pod Refugee types showing resistance to both viruses have been produced.

Pea
Selections as resistant to near-wilt as Rogers Kay have been secured from the cross Wisconsin Perfection x Rogers Kay. It appears that resistance to root rot (*Aphanomyces cutiches*) can be obtained by selection.

1140. 575:633(79.6)

Wartime agricultural research.
52nd Rep. Idaho Agric. Exp. Sta. 1945 : Bull. No. 264 : Pp. 51.

Oats
Several valuable disease resistant selections have been obtained from crosses between Victoria x Richland and Bannock and other adapted smut-resistant varieties. They yield almost as well as Victoria, have white grain suitable for human food, and possess a shorter, stiffer straw than Victoria.

Barley
The unnamed selection Idaho 2157, from the cross Vaughn x Atlas Selection No. 35, is to be named and released in 1946. The variety matures earlier than Trebi, and during an eight-year period it has consistently equalled or surpassed this variety in yield. Idaho 2157 is a six-rowed, white seeded type with a rather short spike of medium density; the awns are semi-smooth. At the Aberdeen Branch Station, work on the promising selections, Ab. 36–6127, Ab. 36–5652 and Ab. 36–6127, continues.

Sorghum
The new variety Idaho Amber, has been developed by pedigree selection from commercial Early Amber. The fault of weak standing ability in Early Amber has been corrected. In addition, Idaho Amber has been selected for yield, uniformity, earliness and quality.

Grapes
Varietal trials are reported.

Tomato
Breeding for curly top resistance was continued; a number of highly resistant selections were secured. In some lines there appears to be linkage between large fruit size and roughness, and between small fruit size and smoothness.

Bean
Mosaic and curly top resistant hybrids involving the common pinto bean and Red Mexican U.I. No. 3 have been further tested; three of the selections are to be distributed in 1946. They are as early as or earlier than the common pinto beans now grown in Idaho. Promising mosaic and curly top resistant selections of garden beans are to be tested for canning and freezing qualities in comparison with standard varieties.

1141. 575:633(79.7)

Fifty-third Annual Report of the Washington Agricultural Experiment Station, for the fiscal year ended June 30, 1943 : Bull. No. 435 : Pp. 163.

Wheat
In winter wheat breeding, selections have been obtained which combine several desirable characters. The back-cross method is being used in some new crosses. Spring wheat breeding aims at the production of a high-yielding soft white variety possessing short straw, desirable quality, and resistance to mildew and the rusts. Back-crossing to transfer the mildew and leaf and stem rust resistance of Hope to Federation is in progress.

Barley
The isolation of hybrid spring barley lines combining high yield and stiff straw is in progress. The F_2 generations of six crosses were tested for yield in comparison with the parents in a study of combining ability; some crosses showed greater hybrid vigour than others.
Investigations on the linkage of several abnormal characters were continued.

Forage grasses
Studies on the forage production of approximately 90 species and strains have been continued. Selection of smooth brome grass, Reed canary grass, meadow foxtail, and crested wheat-grass, and other grass species is reported. Investigations on the F_2 progenies of hybrids between several species of *Agropyron* and durum wheat have been continued. Pea selections from the cross of Alderman with Austrian Winter were tested for cold resistance. The more promising selections produced a luxurious growth in the spring, in comparison with Austrian Winter. Their value as winter cover crops is to be further investigated.

Leguminous forage plants
Inbreeding was found to decrease seed-set in sweet clover. Both white and yellow sweet clover showed a high degree of self-sterility. Data on the reaction of lucerne varieties to witches' broom disease are given. All the commercial varieties tested were found to be susceptible. Several hybrids between *Medicago sativa* and *M. falcata*, and a selection of Kansas Common, designated A–6, showed promising resistance.

Potato
Four hybrid seedlings, derived from Katahdin, and one seedling obtained by selfing the seedling No. 306–114, showed promising leaf roll resistance. Breeding for resistance to both late blight and flea beetle are in progress.

Rubus
Hardiness and resistance to disease and aphid attack are receiving attention in raspberry breeding. In the experimental plots of blackberries and dewberries, Brainerd and WSC 1, Brainerd x Evergreen hybrid, were outstanding for their lack of winter injury under the severe winter conditions in 1942–3.

Blueberry
In breeding for uniformity of ripening and freedom from cracking, the initial work of interspecific hybridization is now complete; several new crosses involve wild species of *Vaccinium*. Cytological and taxonomic studies on the native species were continued.

Strawberry
Breeding for commercial qualities and resistance to yellows and root rot is in progress.

Cranberry
Preliminary hybridization work has now been completed.

Spinach
Varietal resistance to the leaf spot disease, *Heterosporium variabile* Cke, is under investigation.

1142. 575:633(79.7)

Fifty-fourth Annual Report of the Washington Agricultural Experiment Station, for the fiscal year ended June 30, 1944 : Bull. No. 455 : Pp. 168.

Wheat
Genetical studies on winter wheat were mainly concerned with quality as measured by pearling and doughball tests. A number of crosses were grown for subsequent genetical studies of morphological characters and resistance to several diseases. Numerous crosses are being selected with the object of combining several characters. Advanced progenies of wheat x *Agropyron elongatum* crosses were further selected. The more wheat-like selections show a weaker perennial habit than the intermediate forms, but some appear to have the rust resistance of *A. elongatum*; grain quality was poor in all the selections.
Hope and a derivative of H44 were found to carry identical genes for resistance to leaf rust and mildew, the two genes being linked with 25–30% cross-over. The genes determining reaction to stem rust were found to be independent of the genes for mildew and leaf rust resistance. Several hundred pedigree and back-cross lines are under observation with a view to obtaining a combination of the disease resistance of Hope or H44 and the desirable characters of locally adapted varieties. Two selections of the cross Rex x Rio showed resistance to all races of bunt; Washington Selection 6 proved to be resistant to all races except T–16 and L–8.
Certain varieties and selections were highly resistant to dwarf bunt. Several hybrid selections exhibited considerable resistance to two races of flag smut.

Oats
Two new races of *Ustilago Avenae* and one race of *U. laevis* have been identified which are virulent on varieties possessing smut resistance of the Victoria type. Ventura was highly resistant to all but three of 26 races. Several Victoria x Richland selections showed resistance to collections that attack Victoria.

Barley
Winter barley crosses are being studied in an attempt to obtain selections superior to the two standard varieties, White Winter and Olympia. A colchicine-induced tetraploid of White Winter was less winter hardy than the diploid form. Several hundred lines of the cross Atlas x Barbless were grown to select for a combination of high yield, stiff straw, smooth awns and good malting quality. The gene for light green colour 4, lg_4, was located in chromosome I.

Forage grasses
F_2 progenies of hybrids between *Agropyron* species and durum wheats were further studied. The self-fertility of the desirable plants was determined. Back-crosses to *Agropyron* were attempted in one progeny; a certain degree of fertility was obtained.
The mode of inheritance of shattering has been investigated in inbred lines of *Arrhenatherum elatius*; the inbred plants showed considerable differences in self-fertility. Extensive selection of smooth brome, Reed canary grass, meadow foxtail and crested wheat grass was continued. Isolated single clones of smooth brome failed to set seed.
Stem smut resistant lines of crested wheatgrass are to be further tested. Four new races of *Ustilago bullata* were identified; 12 races are now known, four of which attack *Bromus marginatus*. Selections of *B. marginatus* and *Elymus canadensis* showed a wide range of susceptibility to the 12 races. One strain of the former species was almost immune.

Potato
Work on resistance to leaf roll, flea beetle and late blight have been continued.

Stone fruits
The vitamin B_1, B_2 and C contents of several apricot and peach varieties before canning are listed.

Raspberry
Approximately 50 hybrid and inbred selections showing resistance to the mosaic vector, *Amphorophora rubi* Kalt., were inbred to determine whether they were homozygous or heterozygous for resistance.

Blueberry
Cytotaxonomic studies of the native *Vaccinium* species revealed the following species and chromosome numbers: *V. scaparium* Leib., *V. Myrtillus* L., *V. parvifolium* Smith, *V. Chamissonis* Bong., *V. caespitosum* Michx, *V. occidentale* Gray and *V. ovatum* Pursh, all diploids with $n = 12$; and *V. globulare* Ryd., *V. membranaceum* Dougl., *V. ovalifolium* Smith., *V. deliciosum* Piper, *V. uliginosum* L. and *V. quadripetalum* (Gilib.) Schultz, tetraploids with $n = 24$.
The following interspecific crosses have been made and are still in the seedling stage: *V. corymbosum* x *V. membranaceum*, *V. corymbosum* x *V. ovalifolium*, *V. canadense* x *V. parvifolium*, *V. parvifolium* x *V. Myrtillus* and the reciprocal, *V. Vitis-Idaea* x *V. ovatum*, *V. canadense* x *V. ovatum* and the reciprocal, *V. ovatum* x *V. parvifolium*, *V. ovatum* x *V. corymbosum* and the reciprocal, *V. corymbosum* x *V. uliginosum*, *V. uliginosum* x *V. corymbosum* and *V. ovatum* x *V. macrocarpon*.

Strawberry
Breeding for high yield, desirable flesh colour and firmness, and resistance to yellows and root rot has been continued.

Cabbage
Certain varieties exhibited tolerance to aphid attack. The varieties least injured were of the flathead type; the most severely injured proved to be of the early and mid-season round type. Varietal resistance to certain virus diseases is being investigated.

Spinach
Investigations on resistance to *Heterosporium* leaf spot have continued. The progeny of a few lightly infected plants of Viroflay and Giant Nobel are to be studied.

Pea

Hybridization is in progress with a view to developing varieties with improved yield and quality, early maturity, disease resistance, and long haulms suitable for combine harvesting. Genetical studies on certain abnormal characters are to be conducted. The late rogues in the Alaska variety are also to be investigated genetically.

Tests of pea varieties for resistance to *Ascochyta* are in progress.

*GENETICS 575.1

1143. C....., R. 575.1:007(47)

The question of Dr Vavilov's death.

J. Hered. 1946 : **37** : p. 15.

In view of the recent remarks made by Žebrak and Sax on Russian genetics (cf. *Plant Breeding Abstracts*, Vol. XVI, Absts 956 aand 1119) a note is added on the obscurity that appears to hang around the death of N. I. Vavilov.

1144. Halifman, I. A. 575.1:575.3(47)

(Darwinian meeting of the Lenin Academy of Agricultural Science).

Priroda (Nature) 1940 : No. 4 : 107–13.

The general tenor of the speeches made by members of the meeting was rejection of the genetical concepts of Mendel and Morgan, and praise of Darwin for his theory of evolution and of the Soviet workers who have applied his principles to practical problems and recognized the influence of environment in inheritance. Among the speeches reported in brief was that of Lysenko. Lysenko expressed the view that the inherited characters of an organism are equivalent to the demands that organism makes upon the nutrient elements according to its genetical nature; a genetical character, thus expressing itself as a requirement, is therefore built up of elements from the material environment. The speaker argued that, by selection and modification of the environment in which successive generations of an organism live, it is possible to modify, or surpress any given requirement, i.e. the genetical character, in future generations.

Cicin questioned the applicability of the Mendelian ratios to distant hybridizations, and so ultimately also their applicability to more nearly related crosses. He believed that different kinds of reduction division can take place even within the limits of a single anther, and that the results of hybridization work cannot provide criteria to distinguish between botanical species and varieties. Cicin referred to successful vegetative hybridization between woody and herbaceous species of Leguminosae, to both vegetative and sexual hybridization between cultivated cereals and grasses and between tomatoes, potatoes and sunflowers.

1145. 575.1:633(48.5)

Lunds Universitets Årsberättelse 1942–1943. (**Annual Report of Lunds University 1942–1943**).
Håkan Ohlssons Boktryckeri, Lund 1943 : Pp. 79.

Lunds Universitets Årsberättelse 1943–1944. (**Annual Report of Lunds University 1943–1944**).
Ibid. 1944 : Pp. 82.

Lunds Universitets Årsberättelse 1944–1945. (**Annual Report of Lunds University 1944–1945**).
Ibid. 1945 : Pp. 84.

During the period from 1942–45 Heribert Nilsson was engaged at the Botanical Institute in his work on species formation, on his experiments with complex hybrids of *Salix* and observations on natural hybrids in that genus. In the Physiology Section of the Institute, research on races and race hybrids of *Godetia* and on fertilization in *Poa alpina* was conducted by Håkensson, while chromosome counts on some phanerogams, including *Potamogeton* spp., were made by O. Palmgren.

The work of the Institute for Research on Inheritance was hampered by prevailing world conditions, but lectures on genetics etc. formed part of the educational programme.

During 1942–44 Weimarck proceeded with his investigations on *Prunus* hybrids and Hjelmqvist with his study of plant chimaeras.

* General studies, see also individual crops.

1146. Sax, K. 575.11:007(47)
Soviet biology.
Science 1945 : **102** : p. 649.
The author expresses his dissatisfaction with the assurances given by Žebrak (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 596) as to the freedom of genetical research in the Soviet Union. In particular, he asks for information regarding Vavilov and Karpečenko.

1147. Stern, C.,
Schaeffer, E. W. and
Heidenthal, G. 575.113
A comparison between the position effects of normal and mutant alleles.
Proc. Nat. Acad. Sci. Wash. 1946 : **32** : 26–33.
An example is discussed from the genetics of *Drosophila* on variable position effect. It was found that in the heterozygous genotype investigated, the position effect at a particular locus varied according to which allelomorph of a homologous pair had suffered rearrangement.

1148. Novák, J. 575.114:575.12:519
Genetische Polynome als Grundlage zur Ableitung der Genotypen und Phänotypen und ihrer Häufigkeiten bei allen Arten genetischer Veranlagung. (**The genetic polynome as a basis for deriving the genotypes and phenotypes and their frequencies in all kinds of genetic constitution**).
Z. indukt. Abstamm.-u. VererbLehre 1943 : **81** : 343–62.
A mathematical treatment is presented of the application of the author's concept of the polynome in calculating the proportions of genotypes and phenotypes in the progenies of hybrid combinations involving several genes.

1149. Gowen, J. W. 575.125
Significance of additive, dominant, complementary gene action to hybrid vigour in *Drosophila*.
Genetics 1946 : **31** : 217–18. (Abst.).
Further investigation (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 890) on the genetics of hybrid vigour in *Drosophila* indicate that in general additive gene action determines the expression of hybrid vigour. Dominance and complementary gene action were found to account for only a small proportion of the variance in the different groups studied.

1150. Gustafsson, Å. 575.125:575.24:633.16
The effect of heterozygosity on variability and vigour.
Hereditas, Lund 1946 : **32** : 263–86.
From an examination of the literature and from an investigation of his own experiments with barley mutants, the author concludes that single mutations, lethal when homozygous, may bring about increased vegetative vigour when heterozygous. The range of phenotypic variation appears to be greater in heterotic heterozygotes than in the parent homozygotes. These findings indicate that, in evolutionary studies involving population genetics, the effect of a gene must be considered both in its homozygous and heterozygous condition.

1151. Murbeck, S. 575.127.2:582
Bastarder och artsystematik. (**Hybrids and the taxonomy of species**).
Bot. Notiser 1943 : 314–32.
Consideration is given to the bearing of hybridization on the delimitation of species; examples are discussed from the genera *Verbascum, Celsia, Arctium, Viola* and *Potentilla.*

1152. Synge, R. L. M. 575.17:576.12
(**Proteins and evolutionary theory**).
Biohimija (Biochemistry) 1945 : **10** : 179–88.
An attempt is made to ascribe evolutionary processes to changes in the configuration of amino-acid and protein molecules. The author argues that, since proteolytic enzymes (which are proteins) can synthesize peptide linkages, genes may prove to have a protein structure, and that, if such enzymes are subjected to an investigation similar to that carried out by Pauling on antibodies, the nature of gene formation may come to be understood.

1153. Sonneborn, T. M. 575.182:575.17
Inert nuclei inactivity of micronuclear genes in variety 4 of *Paramecium aurelia.*
Genetics 1946 : **31** : p. 231. (Abst.).
Experiments have demonstrated that the *K* gene when occurring in the micronucleus in the presence of a significant concentration of the cytoplasmic factor κ (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 139) is unable to control the killer character whereas the gene *K* when present in the macronucleus can control it. *K* when present in the micronucleus cannot maintain κ, the latter factor being lost in normal autogamy.

1154. Wright, S. and
Dobzhansky, T. 575.22:575.41
Genetics of natural populations. XII. Experimental reproduction of some of the changes caused by natural selection in certain populations of *Drosophila pseudoobscura.*
Genetics 1946 : **31** : 125–56.
This article on the population genetics of *D. pseudoobscura* includes a mathematical analysis of cyclic change caused by the operation of natural selection throughout the year, in the proportions of genes in a mixed population, and deals with the problems raised in the genetical analysis of populations through the various relative selective values exhibited by the different homozygous and heterozygous combinations. It is shown how a balanced system of several genetic types may be maintained indefinitely under such selective conditions.

1155. Dubinin, N. P. 575.24:575.113.7:575.41
On lethal mutations in natural populations.
Genetics 1946 : **31** : 21–38.
The natural mutation rate for lethals was studied in populations of *Drosophila melanogaster* from three different localities. It was found that the concentration of lethals is differentiated by automatic genetic processes, such as the seasonal behaviour of populations, and does not solely reflect the mutation rate.

1156. Wellensiek, S. J. 575.243:581.04
Colchicine-mutaties en hun beteekenis voor de plantenveredeling. (**Colchicine mutations and their significance for plant breeding**).
Jaarb. Algem. Bond Oud-leerl. Middelbaar Landbouwonderwijs 1942 : Pp. 12.
This is a concise exposition on the mutation process, artificial induction of mutation and polyploidy and their effects and applications in modern plant breeding. To use the colchicine technique of polyploid production for practical plant breeding requires the services of specialists for the various economic plants.

1157. Schütze, R. 575.243:581.04:537.531
Die Beeinflussung der Mutationsrate bei *Drosophila melanogaster* durch kombinierte Behandlung mit Arsen und Röntgenstrahlen. (**The influence on the mutation rate of *D. melanogaster* of combined treatment with arsenic and X-rays**).
Z. indukt. Abstamm.-u. VererbLehre 1943 : **81** : 484–99.
An increased mutation rate in *Drosophila* can be obtained by an appropriate combined treatment with X-irradiation and arsenic administration.

ORIGIN OF SPECIES 576.1

1158. Hovanitz, W. 576.12:575.115
A genetic study of wild populations and evolution.
Caldasia, Bogota 1944 : No. 10 : 459–64.
A general discussion is given of changes in genetic constitution occurring in wild populations and their significance in evolution, with reference to a study of a dominant gene difference occurring in wild populations of the butterfly, *Colias chrysotheme*, and the natural hybridization taking place between the two North American races of this species.

1159. KELLER, B. A. 576.12:632.3
(Evolution of plants on the ground of the particularities of their feeding).
Priroda (Nature) 1945 : No. 1 : 26–35.

The various appendages found on fruits and commonly regarded as having a mechanical function in dissemination are, in the view of the author, possessed of a definite physiological function in connexion with nutrition and transpiration.

Experiments are described in which the organic nitrogen of soil samples was doubled in one to three months by spreading cultures of blue-green algae on them, and by adding blue-green algae to a culture solution without nitrogen the total and organic nitrogen content [*sic*] was raised from 0·0032 to 0·018%. These organisms are thought to play an important role in fixing atmospheric nitrogen in desert soils, Turkmenia and other arid zones, either alone or in association with *Azotobacter*. From an evolutionary point of view, it is thought that such organisms represent one of the earliest phases of evolution, and that higher plants, having always had them available as a source of nitrogen, have evolved in other directions. The capacity for fixation of atmospheric nitrogen has apparently been preserved, however, in certain of the higher plants.

1160. LAMPRECHT, H. 576.16:575.242:635.65
Die genisch-plasmatische Grundlage der Artbarriere. **(The gene-plasmatic basis of the species barrier).**
Agri Hortique Genetica, Landskrona 1944 : **2** : 75–141.

A study has been made of a type of mutation termed a "complex" mutation, observed in *Pisum* and *Phaseolus*. The complex mutation is described as a mutation affecting both the vegetative and floral organs, and as showing a monofactorial recessive inheritance. Such mutant plants are sterile, and exhibit morphological characters sharply deviating from those which normally distinguish the species or even the genus. As a result of the study of such mutations, the species is regarded as being characterized by a system of mutually adjusted genes for the development of the vegetative and floral organs; accordingly, if a mutation occurs in the vegetative part of the plant the genes conditioning the transformation of this part into a floral one cannot perform their function, so that a sterile complex mutation is produced.

The nature of interspecific barriers was studied in the cross *Phaseolus vulgaris* L. x *P. coccineus* L. (= *P. multiflorus* Lam.). The data obtained were interpreted as indicating an essential difference of only two genes between the two species. One of these genes determines the position of the cotyledon, the other the form of the stigma. The different alleles of these two genes are said to constitute the genetic basis of the interspecific barrier. It was observed that mitosis in the sterile plants was normal, but that meiosis did not proceed further than tetrad formation, after which considerable degeneration set in. The author puts forward the hypothesis that substances responsible for gene production, the so-called progenes, are not renewed at reduction division in the case of the genes constituting the interspecific barrier when these occur in the protoplasm of an alien species. A discussion is given of the evolutionary significance of the suggested nature of the interspecific barrier.

1161. LAMPRECHT, H. 576.16:575.242:635.65
Intra- and inter-specific genes.
Agri Hortique Genetica, Landskrona 1945 : **3** : 45–60.

As a result of the study of complex mutations and of interspecific hybridization in *Pisum* and *Phaseolus* (cf. Abst. 1160 above) the author has classified genes into two distinct groups: intraspecific and interspecific. Intraspecific genes are those whose alleles govern the variation within a species. Interspecific genes are those whose alleles characterize different species. Interspecific genes can only occur in the dominant form in the reproductive individuals of a species. The recessive allelomorph of an interspecific gene either characterizes a different species in which it is dominant, or causes sterility in the species in which the dominant allelomorph is characteristic. The so-called complex mutations are regarded as recessive mutations of interspecific genes. Two further instances of such mutations are reported, viz., a mutation in *Pisum* from the *ovatus* leaf form to the *obovatus* type accompanied by floral abnormality, and a gamete-sterile mutation occurring in *Phaseolus vulgaris*. The results of the previously reported investigation of the cross *Phaseolus vulgaris* L. x *P. coccineus* L. (= *P. multiflorus* Lam.) are also summarized. (cf. 1160 above). A discussion is given of the significance of interspecific genes for the species

problem. Species are divided into primary and secondary species. The former consist of species which have arisen by complex mutation, i.e. by the formation of interspecific allelomorphs. Secondary species are subdivided into (1) superspecies or autopolyploids, (2) interspecies or allopolyploids, and (3) mixtospecies produced by various chromosomal rearrangements. The species is defined as a unit including all biotypes which differ from all others by at least one common interspecific gene. The lower taxonomic units are regarded as representing different combinations of intraspecific genes.

*CYTOLOGY 576.3

1162. Stomps, T. J. 576.312:576.36
576.312.31

Over de kernen der bacteriën. (**On the nuclei of the bacteria**).
Vakbl. Biol. 1940 : **21** : 270–74.

This short survey of the literature of the subject provides the author with an opportunity for a critical examination of the main views held at present on the problem of the existence of nuclei or nuclear staining material in the bacteria.

1163. Mirsky, A. E.,
Pollister, A. W. and
Ris, H. 576.312.2:578.6

The chemical composition of chromosomes.
Genetics 1946 : **31** : 224–25. (Abst.).

The desoxyribose nucleic acid, histone and non-histone protein constituents of the chromosome have been investigated. The non-histone protein was found to contain a fair quantity of tryptophane. The properties of the isolated proteins are described. Methods have been developed for the quantitative identification of the three constituents in microscopic preparations.

1164. Stapp, C. 576.312.3:632.3

Der Pflanzenkrebs und sein Erreger *Pseudomonas tumefaciens*. XI. Mitteilung. Zytologische Untersuchungen des bakteriellen Erregers. (**Plant canker and its instigator *Ps. tumefaciens*. Communication XI. Cytological study of the bacterial instigator**).
Zbl. Bact. 1942 : **105** : 1–14.

Previous research has suggested that bacterial cells contain a structure similar to the nucleus of higher organisms, but actual identity with the nucleus is still unproved.
Using a modification of Feulgen's straining method the author showed the presence of nucleic-acid positive structures in a series of spore-forming and non-spore-forming bacteria. It was found that the fixation and time for hydrolysis, and, in some cases also, the temperature of hydrolysis had to be varied for different bacteria to obtain clear results.
In a young culture of *Ps. tumefaciens* in carrot juice containing iron and manganese, the most actively motile, short rods of *Ps. tumefaciens* contained one nucleus; the longer rods contained one or two. This fact is at variance with Piekarski's deductions from the study of the paratyphus bacterium and *Bacterium coli*. The significance of the nucleic-acid-positive structures of *Ps. tumefaciens* was made clear by study of the formation of stars and rosettes by this and other bacteria. Only the swarming bacteria form stars and rosettes and always in such a way so that the poles without flagella are at the centre. In the case of *Ps. tumefaciens* a loose star formation was seen after only three hours. The separate rods forming these stars contain one or two nuclei, more rarely three or four. When rods have assembled to form a star, each rod begins to grow in length and somewhat in thickness. The nuclei then wander to the tops of the rods composing the star and at this stage there is always only one nucleus in each rod. The nuclei then fuse to form a single central nucleus, which later differentiates, each component receiving again one nucleus, and, only after further division of this nucleus, do the now separated components again become short swarming rods.
It was found that the shape of the nuclei could be markedly influenced by the fixative. E. W.

*General studies, see also individual crops.

1165. Ruch, F. 576.312.34:576.354.4
Zur Schraubenstruktur des Metaphasechromosoms der 1. meiotischen Teilung bei *Tradescantia virginica.* (**The spiral structure of the metaphase chromosome of the 1st meiotic division in *T. virginica*).**
Vjschr. Naturf. Ges. Zürich 1945 : **90** : 214–15.
The author is unable to confirm the existence of a double spiral structure in the metaphase chromosomes of *T. virginica.* Instead of a major spiral formed by the coiling of a thread consisting itself of a closely-coiled spiral, a major spiral is reported composed of two threads studded at close intervals by chromomeres. It is uncertain whether the two threads observed are simple or composite.

1166. Palmgren, O. 576.312.35(48.5)
Chromosome numbers in angiospermous plants.
Bot. Notiser 1943 : 348–52.
Counts have been made of Swedish wild plants not previously examined.

1167. Rosen, G. von. 576.312.35:578.65
A rapid method for sorting polyploid material.
Hereditas, Lund 1946 : **32** : 129–30. (Abst.).
The chromosome number of the cells of young leaves of beets and peas may be ascertained by soaking them in a 0·05% colchicine solution, and then staining in acetocarmine.

1168. Castro, D. de and
Carvalho Fontes, F. 576.312.35:581.9(46.9)
Primeiro contacto citológico com a flora halófila dos salgados de Sacavém. (**First cytological contact with the halophilic flora of the saltings of Sacavém**).
Brotéria 1946 : **15** : 38–46.
Chromosome numbers have been determined for representatives of the halophytic flora of the Sacavém saltings on the Tagus estuary.

1169. Taylor, H. 576.312.35:582
Cyto-taxonomy and phylogeny of the Oleaceae.
Brittonia 1945 : **5** : 337–67.
Chromosome numbers and chromosome morphology have been studied in 129 species of the Oleaceae. Basic numbers are as follows: $x = 11$, *Menodora*; $x = 13$, *Fontanesia* and *Jasminum*; $x = 14$, *Forsythia*; and $x = 23$, *Fraxinus, Syringa, Phillyrea, Osmanthus, Forestiera, Chionanthus, Olea* and *Ligustrum.* It is assumed that the 23 chromosome group is autopolyploid; nevertheless, polyploidy within genera and species is rare and appears to have played a minor role in speciation. Taxonomic modification are suggested to bring the classification of the family in line with the cytological data.

1170. Gustafsson, Å. and
Nygren, A. 576.35:581.036
The temperature effect on pollen formation and meiosis in *Hieracium robustum.*
Hereditas, Lund 1946 : **32** : 1–14.
Investigations with *H. robustum* Martr. have shown that, while the pollen mother cells divide mitotically at low temperatures, meiotic division occurs readily at higher temperatures. When mitosis replaces meiosis, prophase occurs prematurely. As a result of these findings, it is suggested that apomicts may arise in nature from the effect of climate on the mode of nuclear division of the sporogenous tissues.

1171. Rosenberg, O. 576.35:581.036
The influence of low temperatures on the development of the embryo-sac mother cell in *Lilium longiflorum* Thunb.
Hereditas, Lund 1946 : **32** : 65–92.
Investigations are reported on the effect of low temperature on the development of the egg mother-cells of *L. longiflorum.* In many cases, synapsis was retarded and premature prophase occurred with a tendency towards subsequent mitotic development. In other cases, endomitosis and the formation of diploid restitution nuclei were encountered.

1172. Ehrenberg, L. and Östergren, G. 576.35:581.04 576.35:581.036
Experimental studies on nuclear and cell division. (Preliminary report).
Bot. Notiser 1942 : 203–06.
It is noted that while acenaphthene disturbs the mitotic spindle by causing the chromosomes to cluster together and the fibres to emanate radially from the chromosome group, low temperature appears to act by increasing the spindle curvature and diminishing its radius.

1173. Ehrenberg, L. 576.35:633.584.3
Morphology and chemistry of the metaphase spindle.
Hereditas, Lund 1946 : **32** : 15–36.
Variation in the degree of curvature of the metaphase spindle has been investigated in the root meristem of the hybrid *Salix fragilis* x *S. alba*. Increased temperature caused a straightening of the outline of curvature, while weak concentrations of ethyl alcohol, colchicine and hydrocarbons seem to have the reverse effect. Curvature is more pronounced in the plerome than in the periblem.
It is suggested that increased curvature is caused by contraction of the protein molecules of the spindle, and consideration is given to the various factors which determine the length of the polypeptide chains and thus the spindle form.

1174. Levine, M. 576.356:581.04:537.531
The effect of colchicine and acenaphthene in combination with X-rays on plant tissue—III.
Bull. Torrey Bot. Cl. 1946 : **73** : 167–83.
Details are given of the effects obtained in plant material after treatment with colchicine solution followed by X-irradiation. Clumping, fragmentation and chromosome extrusion were among the more noticeable aberrations induced. Parallel experiments were made with acenaphthene and X-irradiation. The relevance of the experimental data to theories of the mode in which X-irradiation affects biological material is considered.

1175. Noguti, Y. 576.356.5:575:633
(On crop-plant breeding).
Bot. and Zool. 1939 : **7** : 287–94.
This paper outlines what has so far been achieved in various countries, including Japan, towards the induction of polyploidy in various crop plants. Many of the results have been reviewed from time to time in *Plant Breeding Abstracts*.
Hearing of Schlösser's work on tetraploid tomatoes (cf. *Plant Breeding Abstracts*, Vol. VII, Abst. 1054), the author has been engaged in experiments to determine whether the concentration of the cell sap is the cause of parthenogenesis in interspecific or intergeneric hybridization.

1176. Stapp, C. 576.356.5:576.312:581.04:632.3
Der Pflanzenkrebs und sein Erreger *Pseudomonas tumefaciens*. XIII Mitteilung. Über die Bedeutung des Colchicins als polyploidisierendes Mittel für den Erreger und als angebliches Bekämpfungsmittel gegen den Wurzelkropf.
(Plant canker and its instigator *Ps. tumefaciens*, Communication XIII. The significance of colchicine as a polyploidizing agent for *Ps. tumefaciens* and as a remedy for crown gall).
Zbl. Bact. 1944 : **106** : 338–50.
No increase in the size of the "nucleus" or cell could be shown to result on treating culture of *Ps. tumefaciens* with colchicine in concentrations of 0·1–2%. *Bacillus mycoides* and *B. asterosporus* on treatment with 0·5% colchicine developed longer rods than those in the controls, but when used to inoculate agar without colchicine the rods returned to their normal length. No change was seen in the nuclei on staining.
A 2% aqueous solution of colchicine was not effective as a preventive of crown gall produced by *Ps. tumefaciens* in seedlings of apple and pear. E. W.

1177. LEVAN, A. 576.356.5:581.04:633.1
The thresholds of colchicine action in barley, rye, diploid oat, and in their artificial tetraploids.
Hereditas, Lund 1946 : 32 : 294–95. (Abst.).
Diploid and tetraploid representatives of a variety do not appear to have different c-mitotic threshold values. The material investigated included Opal and Archer barleys, Steel rye and *Avena strigosa.*

1178. PRAKKEN, R. and
LEVAN, A. 576.356.5:581.04:635.26
Notes on the colchicine-meiosis of *Allium cernuum.*
Hereditas, Lund 1946 : 32 : 123–26.
A reinvestigation of c-mitosis in *A. cernuum* has shown that despiralization is not omitted, nor does the centromere divide immediately after the separation of the bivalents.

1179. LÖVE, A. and
LÖVE, D. 577.8:577.17
Experiments on the effects of animal sex hormones on dioecious plants.
Ark, Bot. 1945 : 32A : No. 13 : 1–60.
This report embodies the results of experiments made with animal sex hormones on dioecious plants (*Rumex* and *Melandrium*) during four years.

EXPERIMENTAL TECHNIQUE 578

1180. CARVAJAL, F. 578.08
A superior pith for free-hand sections.
Science 1946 : 103 : p. 112.
The pith of *Tetrapanax papyriferum* Koch is recommended for supporting plant material for hand sectioning.

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1181. STOUT, A. B. 581.162.5:575.12
Types of intra-specific incompatibilities.
Bull. Torrey Bot. Cl. 1946 : 73 : 93–95.
A summary is given of a lecture delivered at the meeting of the Torrey Botanical Club held in May, 1945. Intraspecific incompatibilities, chiefly in the plant kingdom, are discussed under the following headings: (1) the diploid-haploid class, (2) the haploid-haploid class, and (3) the diploid-diploid class.

1182. MÜNTZING, A. and
MÜNTZING, G. 581.163:575.113.4
Some new results concerning apomixis, sexuality and polymorphism in *Potentilla.*
Bot. Notiser 1941 : 237–78.
This paper includes a discussion on the genetic mechanism determining apomixis in *Potentilla*; a balanced system of multiple genes appears to be involved, which when disturbed allows normal sexual reproduction to take place.

1183. TURESSON, G. 581.163:581.5:001.4
Variation in the apomictic microspecies of *Alchemilla vulgaris* L.
Bot. Notiser 1943 : 413–27.
The term "agamotype" is proposed as an equivalent for "ecotype" in apomictic plants. Similarly, the term "agamospecies" is introduced as the analogue of the "ecospecies".

1184. 581.9(47)
Nytt utifrån. **(News from abroad).**
Fruktodlaren 1946 : No. 1 : 15–16.
A short account is given of Sukachev's expedition as leader of 80 technical workers, representing soil science, geobotany, climatology, economics and chemical technology, to southern Kirghiz.

* General studies, see also individual crops.

1185. Dunin, M. S. 632–1.521.6:581.14:576.12
(The immunogenesis of plants, and its practical utilization).
Moskovskaja ordena Lenina Seljskohozjaĭstvennaja Akademija imeni K. A. Timirjazeva, Naučnaja Konferencija 6–13 Dekabrja 1944 g. II (Timirjazeva Agric. Acad. Moscow Rep. Sci. Conf. 6–13 December) 1944 (1945) : No. 2 : 56–58.

The correct method of approach to the study of diseases and the acquisition of immunity is considered to be that of dialectical materialism and the Darwinian theory of evolution. By means of such an approach, plant diseases have been broadly classified as follows: (1) diseases affecting the host plant in the ascending phase of ontogenesis; (2) diseases peculiar to the second phase of ontogenesis; and (3) diseases which cannot be definitely placed in either of the two preceding classes. From this classification there appears to be grounds for supposing that: (1) external conditions and certain genetical types of plant which favour rapid growth in the ascending phase will increase resistance to diseases of the first class; (2) species and varieties selected for resistance to a particular disease which clearly belongs to one or the other of the first two classes will be also resistant to other diseases of the same class; (3) by selecting suitable parent plants, or by establishing external conditions which hasten the first phase and delay the second, it should be possible to produce a plant which is resistant to diseases belonging to both of the first and second classes.

1186. 632.3:535.61–31:575.243
Demerec, M. 632.3:537.531:575.243
Induced mutations and possible mechanisms of the transmission of heredity in *Escherichia coli*.
Proc. Nat. Acad. Sci. Wash. 1946 : **32** : 36–46.

The mutation rate of *E. coli* is increased after treatment either with ultra-violet light or X-rays. Some of the induced mutations appear after the first subsequent bacterial division, others are only manifested after several divisions. In the light of these facts, the author discusses various hypotheses on the genetic mechanisms of the bacteria.

1187. 632.3:535.61–31:631.521.6
Witkin, E. M. 632.3:537.531:631.521.6
A case of inherited resistance to radiation in bacteria.
Genetics 1946 : **31** : p. 236. (Abst.).

A sample of strain B of *Escherichia coli* has been observed whose last survivors after ultra-violet radiation show relative resistance to both ultra-violet and X-ray treatments. The resistance is stable and heritable.

1188. Vaughn, R. H. 632.3:582
The acetic acid bacteria.
Wallerstein Laboratories Communications 1942 : **5** : 5–26.

The morphological and physiological characteristics of species of *Acetobacter* are described, and the taxonomy of the genus is examined. A scheme of classification is presented, based upon the simple determination of the oxidative activity of the organisms.

1189. Lutman, B. F. 632.3–1.521.6:633
Actinomycetes in various parts of the potato and other plants.
Bull. Vt. Agric. Exp. Sta. 1945 : No. 522 : Pp. 72.

An attempt is made to establish the theory that all parts of the potato and probably all parts of the higher plants in general are systematically infected by *Actinomyces* filaments. This infection is believed to exert a fundamental influence on pathological reactions and on such physiological phenomena as tuberization. The evidence is histological and microchemical; the actinomycete has not been isolated.

1190. Tatum, E. L. and
Bell, T. T. 632.421.9:577.16:575.243
Neurospora. III. Biosynthesis of thiamin.
Amer. J. Bot. 1946 : **33** : 15–20.

Investigations on four thiamin deficient mutant strains of *Neurospora* are reported. Strains

* General studies, see also individual crops.

9185, 18558 and 17084 were derived from *N. crassa*, and strains 1090 from *N. sitophila*. Each of these strains was found to differ from the wild thiamin producing type by only one biochemical reaction involved in the synthesis of thiamin, and to differ in a single gene. The mutant genes in the three strains of *N. crassa* were not allelic. Strain 18558 was deficient in the synthesis of thiazole, while in strain 9185 the coupling of thiazole and pyrimidine failed to take place. Mutant strains 17084 and 1090 were found to require for growth either thiamin or a mixture of thiazole and pyrimidine.

1191. Mitchell, H. K. and Houlahan, M. B. 632.421.9:577.16:581.036:575.243
Neurospora. IV. A temperature-sensitive riboflavinless mutant.
Amer. J. Bot. 1946 : **33** : 31–35.

A mutant of *Neurospora* (51602) has been found which synthesizes riboflavin at a rate approaching that of a wild type strain at temperatures below 25° C. but requires an external source of the vitamin above 28° C. The mutant differs from the wild type by a single gene for one biochemical reaction involved in riboflavin synthesis. Possible explanations of the existence of temperature-sensitive mutants are discussed.

1192. Lindegren, C. C. 632.422.3:575.11:575.182
Cytoplasmic effect and chromosome maps in *Saccharomyces cerevisiae*.
Genetics 1946 : **31** : p. 223. (Abst.).

Yeast hybrids have been produced which are heterozygous for genes conditioning mating type, galactose and melibiose fermentation, auto-agglutination of the cells in broth, and certain colonial characters. Some of these genes are linked. Cytoplasmic inheritance was found to complicate genetical analysis in the case of the fermentation of galactose and melibiose, and vitamin synthesis. By suitable crosses it was, however, possible to secure definite Mendelian segregations, and to demonstrate that galactose fermentation is controlled by a single locus.

1193. Wallerstein, J. S. and Schade, A. L. 632.422.3:576.16:582
Some considerations on the nature of yeast. II. Their origin and relation to other organisms.
Wallerstein Laboratories Communications 1940 : **3** : 182–98.

The Saccharomycetaceae and *Torulae* are described in relation to the bacteria and main groups of fungi. The possible evolution of the Saccharomycetaceae is traced, following the work of Guilliermond. A classification of the chief genera of the Saccharomycetaceae is also presented based upon the work of Stelling-Dekker.

1194. Wallerstein, J. S. and Schade, A. L. 632.422.3:576.312:575.1
Some considerations on the nature of yeast. I. The structure and functions of the cell.
Wallerstein Laboratories Communications 1940 : **3** : 91–106.

A general account of the yeasts is presented. Descriptions of their cytology, reproduction, hybridization and mutation are included.

1195. Rhoades, H. E. 632.422.3:577.15
The adaptive enzymes of certain strains of yeast.
Wallerstein Laboratories Communications 1941 : **4** : p. 86. Abst.

Enzyme production was investigated in nine yeast strains belonging to the following species: *S. cerevisiae*, *S. ellipsoideus*, *S. carlsbergenensis* and *Schizosaccharomyces Pombe*. Nine sources of carbon were used in the fermentation experiments, viz., glucose, mannose, galactose, sucrose, raffinose, maltose, melezitose, α-methylglucoside and trehalose. The enzymes produced were grouped into two main types, adaptive and constitutive. The different strains showed marked variation in their capacity to produce the two types of enzymes.

1196. Reed, G. M. 632.45:57616.
Physiologic specialization of the parasitic fungi. II.
Bot. Rev. 1946 : **12** : 141–64.

A useful review is presented of recent work on physiological specialization in the fungi. Principle attention is given to cereal rusts and smuts. There is a bibliography containing 177 titles.

1197. Fries, N. 632.472.3:577.8
Über die Sexualität einiger Hydnaceen. (**The sexuality of some Hydnaceae**).
Bot. Notiser. 1941 : 285–300.
Tetrapolar sexuality has been demonstrated for species of *Hydnum* and *Irpex*, and bipolar sexuality for *Radulum*.

1198. Sievers, A. F. and
Higbee, E. C. 632.951.1
Plants for insecticides and rodenticides.
Foreign Agric. Rep., U.S. Dep. Agric., 1943 : No. 8 : Pp. 20.
Insectidal and rodenticidal plants are described, with reference to their distribution, habit, the parts used and commercial value. Bibliographical references are included.

ECONOMIC PLANTS 633

1199. 633–2.112–1.521.6(47)
(**Letter from L. Zonštein**).
Sovhoznoe Proizvodstvo (State Farming) 1945 : No. 3 : p. 49.
The correspondent describes his experiences with growing and comparing varieties of maize grown for silage and grain, sunflower, water-melons, melons, pumpkins, gram and *Phaseolus* spp., under the very dry conditions in the Issyk-Kul province of the Kirghiz S.S.R. All the maize varieties produced abundant foliage and some of them also cobs. The sunflowers did not survive the drought. The cucurbits all grew successfully without irrigation, with the exception of one variety, which failed to form flowers.

1200. Avdonin, N. 633–2.112–1.521.6(47)
(**Achievements of science—in the service of socialistic agriculture**).
Socialističeskoe Seljskoe Hozjaĭstvo (Socialistic Agriculture) Moscow 1945 : Nos 4–5 : 54–58.
In the south-eastern U.S.S.R., the soil in autumn is often too dry to ensure vigorous germination of seed sown at that time. Among the measures required to diminish the adverse effects of seasons of drought in this region, the growing of drought resistant varieties is included. The Institute of the South-eastern U.S.S.R. is at present experimenting with varieties of spring and winter wheat, sunflower, winter rye and millet. The soft spring wheats mentioned are Lutescens 53/12, Albidum 43 and Albidum 21. The hard spring wheat, Candicans 75/09, is also mentioned.

1201. Ivanoff, S. S. 633–2.7–1.521.6:578.08
A seedling method for testing aphid resistance and its application to breeding and inheritance studies in cucurbits and other plants.
J. Hered. 1945 : **36** : 357–61.
A rapid method of testing cucurbit seedlings for aphid resistance is described, based upon the bending of the petiole and curling of the leaf observed in susceptible plants. The technique has also been found to be applicable to cotton, okra, and the cowpea.

CEREALS 633.1

1202. Boewe, G. H. 633.1–2–1.521.6(77.3)
Disease of small grain crops in Illinois.
Circ. Ill. Nat. Hist. Surv. 1939 : No. 35 : Pp. 130.
The different diseases of wheat, oats, barley and rye described; reference to varietal resistance is included.

1203. Oort, A. J. P. 633.1–2.451.2:576.16:631.521.6(49.2)
De vatbaarheid voor stuifbrand van in Nederland verbouwde of beproefde rassen van tarwe en gerst. (**The susceptibility to loose smut of varieties of wheat and barley cultivated or tested in the Netherlands**).
Meded. LandbHoogesch. Wageningen 1940 : **44** : Pp. 54.
A tabulated account is given of experiments in 1937 and 1938 to determine the susceptibility of wheat and barley to loose smut (*Ustilago Tritici* and *U. nuda*). The varieties were tested both by inoculation and natural infection.
The results confirmed the opinion that wheat cannot be infected with the loose smut of barley or barley with the wheat loose smut. The existence of physiological specialization was established

in both *U. Tritici* and *U. nuda*; the form of *U. Tritici* on summer wheat is different from that on winter wheat, and both forms can be separated by their reaction on the Picardie variety. The occurrence of loose smut in the Peragis 8057 wheat, which is resistant to the loose smut of winter wheat, is believed to indicate that it is a different physiological form. The forms of *U. nuda* on summer and winter barleys are also different, and can be separated by their reaction on a large number of summer barley varieties.
In conclusion, it is stated that, while a large number of wheat varieties resistant to *U. Tritici* is available for breeding purposes, no varieties immune from or highly resistant to *U. nuda* were found in barley. V. A.

WHEAT 633.11

1204. Berg, S. O. 633.11:575(48.5)
Eroica, ny mycket högavkastande höstvetesort för södra och östra Götalands slättbygder. (**Eroica, a new very high yielding autumn wheat variety for the lowlands of Southern and Eastern Gotäland**).
Agri Hortique Genetica, Landskrona 1943 : **1** : 15–28.
Full details of the performance of the new wheat, Eroica, in official and other trials from 1935 to 1942 at Weibullsholm and in other parts of Sweden are recorded (cf. Abst. 1207 below). It is likely to be of value in future breeding of autumn wheats and has already been crossed with different varieties. One hybrid, Eroica x 8739, the third generation of which was sown in 1942, will it is hoped, combine the high yield of Eroica with greater hardiness than the present varieties.

1205. Berg, S. O. 633.11:575(48.5)
Ny elit av Atlevårvete med tidigare mognad. (**An earlier ripening, new élite of Atle spring wheat**).
Agri Hortique Genetica, Landskrona 1943 : **1** : 29–30.
The new élite has the short straw, good standing capacity, high yield and excellent baking quality of the original Atle and has the additional advantage of ripening one day earlier than Extra Kolben II.

1206. Berg, S. O. 633.11:575(48.5)
Weibulls Bronsvete. Ny vårvetesort för Götalands slättbygder. (**Weibulls Brons wheat. A new spring wheat variety for the plains of Götaland**).
Agri Hortique Genetica, Landskrona 1945 : **3** : 1–13.
A new spring wheat variety named Weibulls Brons (Weibull's Bronze), has been developed from a cross between Aurore and Extra Kolben II. In tests at Weibullsholm and official trials in various spring wheat growing regions in Sweden during the period 1933–44 it has shown superiority in grain yield and hectolitre weight in comparison with Extra Kolben II, Atle, Progress, Diamant II and Fylgia. The new variety ripens earlier than Extra Kolben II, Atle and Progress, but one or two days later than Diamant II and Fylgia. It has stronger straw than Extra Kolben II, Diamant and Fylgia. In baking quality it equals Extra Kolben II. Weibulls Brons is recommended for cultivation in the Götaland plains.

1207. Lamprecht, H. 633.11:575(48.5)
Förädlingsarbetet med höstvete på Weibullsholm. (**Breeding work with autumn wheat at Weibullsholm**).
Agri Hortique Genetica, Landskrona 1943 : **1** : 3–14.
An account is given of the autumn wheat varieties bred at Weibullsholm since 1907.
A new variety called Eroica has been developed from the cross (Bánkuter 178 x Standard) x Äring. During the period 1935–42 Eroica outyielded Standard, Äring and Skandia II, varieties suitable for South and East Götaland, by 9–17%. Reference is made to an unnamed variety, No. 8739, produced from the cross Ergo x Svea II. It is earlier maturing than Ergo and has shown a winter hardiness superior to that of all other varieties bred and officially tested in Sweden.

1208. Reitz, L. P. and
Heyne, E. G. 633.11:575(78.1)
Wheat planting and wheat improvement in Kansas.
33rd Bienn. Rep. Kans. Bd Agric. 1941–1942 (1942) : **38** : 168–207.
A brief historical survey is given of the use of different varieties in Kansas, and varieties are discussed with reference to commercial requirements. The objectives of breeding work at the Kansas

Agricultural Experiment Station are outlined, and breeding work for the following characters is described in detail: high yield per acre and test weight per bushel, earliness, winter hardiness, resistance to lodging and shattering, and resistance to leaf and stem rust, bunt and Hessian fly. Recent achievements include the production of Comanche and Pawnee.

1209. Stoa, T. E. 633.11:575(78.4)
Cadet—a new beardless wheat.
Bi-m. Bull. N. Dak. Agric. Exp. Sta. 1946 : **8** : No. 3 : 21–22.

The new beardless wheat variety, Cadet, has been developed from a cross between Merit and Thatcher. Cadet compares favourably with other hard red spring wheats in stem and leaf rust resistance; its bunt resistance is similar to that of Thatcher and Newthatch. The variety is late maturing. In test weight per bushel Cadet resembles Thatcher and Regent. It shows good milling and baking quality.

1210. Granhall, I. 633.11:575.125
On heterosis effects in *Triticum vulgare*.
Hereditas, Lund 1946 : **32** : 287–93.

In two wheat crosses, Hindi (bearded) x Extra Kolben II (beardless) and Pansar (beardless) x Pansar b (bearded), the F_2 half-bearded individuals were found to display the greatest degree of vegetative vigour. The second cross involved parents differing in only one factor.

1211. 633.11:575.127.5:633.11*Aegilops*
Dumon, A. G. 633.11:576.16
Het genetisch gedrag van den F_1-soortbastaard *Triticum vulgare lutescens* x *Aegilops ventricosa*. (**The genetic behaviour of the F_1 interspecific hybrid *T. vulgare lutescens* x *Ae. ventricosa***).
Agricultura, Louvain 1942 : **43** : 1–6.

As a contribution to the phylogeny of wheat, the author has made a genetic study of the F_1 from *T. vulgare* var. *lutescens* x *Ae. ventricosa*. Owing to the war neither a cytological study nor back-crossing of the F_1 in 1940 was possible. Like most *Ae. ventricosa* crosses with varieties of one of the wheat groups, the F_1 hybrid was completely sterile. Breadth of ear was intermediate, while the closed glumes of *Aegilops* were dominant.

Length of rachis showed transgressive inheritance ranging between 11·4 and 13·2 cm. as compared with 8·3 and 9·2 cm. for the *Aegilops* and wheat parent respectively, while the lengths of the segments in the F_1 plant were 14.3 mm. as compared with 11 and 8·5 mm. in the parents.

The nerves of the glumes were as pronounced in the hybrid as in *Aegilops* and glume pubescence was similarly dominant.

Ae. ventricosa has a brittle rachis, though not so brittle as in *T. Spelta*, but in the hybrid in question the tough rachis of *T. vulgare* prevailed. The keeled condition of the glumes found in *T. vulgare* was completely dominant in the F_1. Thickness of the stem wall approximately equalled that found in *T. vulgare* var. *lutescens*, while in *Ae. ventricosa* it was very thin.

The vigorous tillering of *Ae. ventricosa* (c.10 tillers) was dominant, the F_1, with normal spacing, producing about 11 tillers. The procumbent stem of *Ae. ventricosa* is recessive to the erect habit in *Triticum*; length of stem in the hybrid was intermediate. The light brown colour of the glume in *Aegilops* also proved dominant.

Phylogenetically it seems possible that the lax ear, so desirable for highly productive varieties, has been brought into the Emmer group from *Aegilops*, but the tough rachis of the Dinkel group is not derived from *Ae. ventricosa*.

The artificial production of *T. vulgare* by crossing *Aegilops* with Emmer types does not prove that the phylogeny of our present day wheats have followed the same path.

1212. Pao, W. K. and
Li, H. W. 633.11:575.182.061.633(51)
Maternal inheritance of variegation in common wheat.
J. Amer. Soc. Agron. 1946 : **38** : 90–94.

The inheritance of a yellow-striped variegation which occurred in a plant of the *Triticum vulgare* variety, Mo's 101, has been investigated. The yellow-striped plants always segregated into normal green, variegated and pure yellow plants in the subsequent generation, showing that yellow stripe is a maternally inherited character.

1213. Poddubnaja-Arnoljdi, V. A. 633.11:576.312.34
A contribution to the chromosome morphology of hard wheat.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1945 : **48** : 278–80.

By means of a technique involving chilling, the morphology of the somatic chromosomes was studied in *Triticum durum expansum* var. *melanopus*, *T. durum abyssinicum* var. *Arraseita* and *T. durum abyssinicum* var. *gondaricum*. The paper deals in detail only with the chromosomes possessing satellites, usually two pairs in number. *T. durum abyssinicum* var. *gondaricum* was distinguished from the other two varieties by one pair of very small isobrachial satellited chromosomes; the other pair with satellites was distinguished by very unequal arms and large size. In the other two varieties both pairs of satellited chromosomes were large and had very unequal arms. It is pointed out that the formation of small isobrachial chromosomes in *T. durum abyssinicum* var. *gondaricum* may have been due to translocation.

1214. Sears, E. R. 633.11:576.356
Isochromosomes and telocentrics in *Triticum vulgare*.
Genetics 1946 : **31** : 229–30. (Abst.).

Isochromosomes and telocentric chromosomes involving the long arm of the speltoid or IXth chromosome of common wheat constituted 7·0 and 10·8% respectively, of the detected chromosomes transmitted through the ovules of monosomic IX plants. In transmission and frequency of abnormal division, univalent isochromosomes and telocentrics did not differ markedly from normal monosome IX. In mitosis telocentrics were occasionally observed to be lost or to give rise to isochromosomes, while less frequently isochromosomes were entirely lost, one arm lost or they became attached to a telocentric chromosome. One telocentric also gave rise, apparently at meiosis, to a chromosome with two arms, the longer of which was less than the normal length, and the shorter homologous with a portion of the longer arm. It is also reported that in mitosis an isochromosome for chromosome VII gave rise to a dicentric, which usually passed unchanged through meiosis and mitosis.

1215. Medvedeva, G. B. 633.11:581.46:575.11:575.3(47)
A contribution to the study of the inheritance of awnedness in wheat.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1945 : **47** : 507–09.

The inheritance of the awned condition was studied in three crosses, in which the awnless wheat, *Triticum turgidum* var. *compositum*, was crossed on to the awned wheats, Melanopus 069, *T. dicoccum* var. *rufum*, and the wild awned wheat, *T. dicoccoides* var. *pseudoiordanicum*. One group of F_1 plants were grown in hot-beds under optimal conditions, and another group in the greenhouse under poor cultural conditions. Under the optimal contitions the F_1 hybrids showed dominance of awnlessness. Under poor conditions the F_1 hybrids were awned. The awned and awnless F_1 progeny were each divided into two groups, one of which was grown in the greenhouse and the other in the hot-bed. The F_2 hybrids exhibited considerable variation in the expression of awns, and could no longer be classified as awned and awnless. By an analysis of the awn measurements it was found that the effect of the environment upon the expression of awns observed in the F_1 persisted in the F_2, and was intensified when the conditions to which the F_1 hybrids were subjected were repeated during the growth of the F_2 generation.

1216. 633.11–1.557:581.02:664.641.016
Feekes, W. 581.143.26.03:633.11
Verslagen van de Technische Tarwe Commissie. XVII. De tarwe en haar milieu. (**Report of the Technical Commission on Wheat. XVII. Wheat and its environment**).
Drukkerij Gebroeders Hoitsema N.V.—Groningen 1941 : 523–888.

This fully documented report deals with a large body of experimental and other evidence relating to wheat cultivation in the Netherlands, regional differences in quality, growth rhythm studies, including the influence of vernalization, its technique and the classification of varieties according to the latest sowing period which will give a maximum yield, nitrogen manuring in relation to yield and quality, heat damage, and morphological crop analysis in the study of adaptation in wheat.

An extensive English summary is provided and the headings, etc., for the numerous tables are given in English as well as Dutch. There is also a bibliography of 227 references.

1217. 633.11–2–1.521.6:575.
633.6–2–1.521.6:575
CHESTER, K. S.
The genes of plenty.
Sci. Mon. N.Y. 1945 : 483–85.
A brief review is given of achievements in breeding of disease resistance in wheat, sugar beet and sugar cane.

1218. SAFRONOV, A. 633.11–2.11–1.521.6:575(47)
(Crimean wheat).
Sovhoznoe Proizvodstvo (State Farming) 1945 : Nos. 4—5 : 21–22.
The rainfall in the Crimea is not large; during the critical period of spring it is between 50 and 60 mm.; August and September are the driest months. During winter the day temperature is above 0° C., but at night it falls below zero. There is little snow. In order to meet these conditions, several varieties of Crimean wheat have been obtained by selection. Unimproved Krymka has been the source of some varieties. Other varieties are Novo-Krymka 0102, Novo-Krymka 0204, and Južnaja 1–N–9. Some of the varieties contain as much as 19% of protein, and are, in general, of high quality. They give high yields, and are hardy, able to withstand drought, and mature early. I. Z.

1219. YU, T. F.,
WANG, H. R.,
FANG, C. T., and
YIN, S. Y. 633.11–2.451.3:576.16:631.521.6(51)
Preliminary studies on physiologic specialization in *Tilletia Tritici* and *T. levis* in China.
Phytopathology 1945 : **35** : 879–84.
Data on the physiological races of *Tilletia Tritici* (Bjerk.) Wint. and *T. laevis* Kühn in China have been obtained. The differential varieties used were Marquis, Mindum and 2H80. Four races of *T. Tritici* and six races of *T. laevis* were identified, and designated T–1 to T–4 and L–1 to L–6, respectively.

1220. RODENHISER, H. A., and
HOLTON, C. S. 633.11–2.451.3:576.16:631.521.6:575(73)
Distribution of races of *Tilletia caries* and *Tilletia foetida* and their relative virulence on certain varieties and selections of wheat.
Phytopathology 1945 : **35** : 955–69.
The identification is reported of two new races of *Tilletia caries* (DC.) Tul., designated T–15 and T–16, and five new races of *T. foetida* (Wallr.) Liro, numbered L–11 to L–15. Three of the new races of *T. foetida* were identified in collections from Mexico. The distribution of the 16 races of *T. caries* and 15 races of *T. foetida* now known is described. The data indicate that the distribution of specific wheat varieties is the most important factor determining the prevalence of certain physiological races within a given region.
The results of varietal tests with the physiological races of both species of common bunt are summarized. At present the Hope factor for resistance appears to be adequate for the control of the bunt races infecting the spring wheats, while combinations of the Oro and Martin or the Oro and Ridit factors appear to be effective in controlling bunt in the winter wheats.
Triticum Timopheevi exhibited general resistance, but hybrids between this species and *T. aestivum* did not show the general resistance of the *T. Timopheevi* parent.
The problem of breeding for dwarf bunt is also considered.

1221. GADEA LOUBRIEL, M. 633.11–2.451.3–1.521.6(46)
Estudios previos en torno al problema del tizón o caries del trigo (género *Tilletia*).
[**Preliminary studies on the problem of bunt or caries of wheat (genus *Tilletia*)**].
Bol. Inst. Nac. Invest. Agron. Madr. 1945 : No. 13 : 241–67.
This paper includes details of the reactions of the wheat varieties, grown in Spain, towards attack by *Tilletia*. Several varieties introduced from America and the European variety Apulia Precoce (Early Apulia) proved resistant to the Spanish races.

1222. Yu, T. F.,
Wang, H. R.,
Fang, C. T., and
Yin, S. Y. 633.11–2.451.3–1.521.6(51)
Studies on physiologic specialization in *Tilletia tritici* and *T. levis* in China.
Chinese J. Sci. Agric. 1944 : **1** : 281–87.

On the basis of the differential reaction of the wheat varieties, Marquis, Mindum and 2H80, four races of *Tilletia Tritici* and six races of *T. laevis* have been identified and numbered T–1 to T–4 and L–1 to L–6, respectively. An account is given of the distribution of the races throughout China. The variety 2H80 has proved to be resistant to all races of stinking smut; since this wheat possesses other desirable characters it should be valuable in breeding for stinking smut resistance.

1223. Bremer, H. and
Özkan. 633.11–2.451.3–1.521.6(56)
Türkiye'de sürme hastaliğinin mevkii ve ehemmiyeti. (**Position and importance of bunt in Turkey**).
Ziraat Dergisi 1943 : **4** : 124–30.

Losses due to wheat bunt in Turkey amounted during 1934–41 to 15-20% of the total production. The growing of resistant strains should therefore be promoted.
Among the excellent Turkish wheats it seems likely there must be some resistant to bunt.
The Central Institute for Agricultural Problems recently tried to infect a number of wheat races. Such trials will have to be continued over a number of years before their results can have any practical significance, but the results obtained so far are promising, as they show that bunt-resistant wheats do exist.
Last year the Eskişehir Plant Breeding Station tried infecting 305 soft wheats and native soft wheats from Erzurum with 24 strains of bunt from eight of the main regions in the country. In spite of the heavy infection no disease could be observed, and the same was true again this year. During the past two years many other races of wheat, from all parts of the country, also showed resistance to the Ankara type of bunt. The trials are being continued, and must be extended to other parts of the country.

1224. Bremer, H. and
Özkan. 633.11–2.452–1.521.6(56)
Türkiye'de hububatin pas hastaliklari hakkinda tetkik ve mütalâalar. (**Investigations and observation of rust diseases on cereals in Turkey**).
Ziraat Dergisi 1944 : **5** : 5–12.

There are some rust resistant cereal varieties in Turkey. In 1943, 40 varieties of foreign and Turkish wheats sown on the plots of the Central Institute for Agricultural Problems at Ankara showed that some of the early forms had high resistance to yellow rust. These results were confirmed at the Eskişehir Seed Improvement Station.
Tests are to be continued and the possibility of the presence of different races of rusts must be studied, as some varieties, after having been resistant for some years, or after being grown in a new locality, have often suffered severely from rust.
It is hoped ultimately to discover rust resistant wheat and barleys for every locality in Turkey.

1225. Cartwright, W. B.,
Caldwell, R. M. and
Compton, L. E. 633.11–2.7–1.521.6:581.036
Relation of temperature to the expression of resistance in wheats to hessian fly.
J. Amer. Soc. Agron. 1946 : **38** : 259–63.

Experiments on six wheat varieties have shown that in general temperature has a marked effect on both the percentage of plants infested with Hessian fly and the intensity of infestation, and that warmer temperature results in reduced resistance. The effect was found to be relatively smaller in susceptible than in resistant varieties. A significant interaction between variety and temperature was not indicated. The reaction of the resistant durum wheat, P.I. 94587, was, however, found to be fundamentally different from that of the other resistant durum wheats investigated, since its resistance was not reduced at the higher temperatures.

1226. Bonnett, O. T.,
Woodworth, C. M.,
Dungan, G. H., and
Koehler, B. 633.11–2.8–1.521.6:575(77.3)
Prairie: a new soft winter wheat for Illinois.
Bull. Ill. Agric. Exp. Sta. 1945 : No. 513 : 595–600.

The new variety Prairie originated as a mosaic-resistant single plant selection of Illinois 2 (C.I. 11537). Prairie is a high yielding bearded, stiff-strawed, soft, red winter wheat. It is winter-hardy, and has good milling and baking qualities. It is resistant to mosaic and the physiological races of black stem rust commonly occurring in Illinois. It shows susceptibility, however, to loose smut, leaf rust and bunt.

1227. Feekes, W. and
Dobben, W. H. van 633.11:664.641.016(49.2)
Verslagen van de Technische Tarwe Commissie. XV. Vochtgehalte en bewaarbaarheid van tarwe. (**Report of the Technical Commission on Wheat. XV. Moisture content and storage property of wheat**).
Drukkerij Gebroeders Hoitsema N.V.—Groningen 1941 : 435–63.

This practical study concerns the moisture content of Dutch and French wheats grown in Holland, the danger of heating, hygroscopic properties, seasonal changes in moisture content, and the effect of moisture and of artificial drying on wheat.
Particulars are given of the reactions of Carstens V, Juliana and Joncquois in a storage experiment. The French wheat, Joncquois, was the worst damaged after prolonged storage.

1228. Feekes, W. and 633.11:664.641.016(49.2)
Dobben, W. H. van 633.11.00.14(49.2)
Verslagen van de Technische Tarwe Commissie. XIV. Bakonderzoek. bij de rassenproeven 1933–38. (**Report of the Technical Commission on Wheat. XIV. Baking studies in variety trials 1933–38**).
Drukkerij Gebroeders Hoitsema N.V.—Groningen 1940 : 339–429.

This is a detailed report on tests of the yield, commercial value and baking quality of wheat varieties from experimental plots in different parts of Holland.
The varieties superior to the Dutch wheats in baking quality proved inferior in yield and resistance to disease; and the breeder will have to evolve a type satisfactory in all three respects.
Discussing differences between races in regard to the use of improvers, the writer suggests that, in the common wheat varieties grown in Holland, high gluten content is an advantage as regards baking properties, but that another group also exists in which high gluten content may be a handicap.
Vernalization and sowing date had little effect on quality.

1229. Harris, R. H. and
Waldron, L. R. 633.11:664.641.016:519.241.1(78.4)
The relation of test weight and protein content to the milling and baking quality of hard red spring wheat hybrids.
J. Agric. Res. 1946 : **72** : 131–36.

In the analysis of 659 samples of hard red spring wheat grown in nursery rod rows in North Dakota, highly significant differences between crop years were found in the test weight, protein content of the grain, flour yield and loaf volume. These differences are regarded as mainly due to the annual variation in weather conditions. The correlation coefficients between test weight and flour yield and those between protein content and loaf volume were found to be too low to provide a reliable basis for the prediction of milling and baking quality in breeding.

1230. Feekes, W. and
Dobben, W. H. van 633.11:664.641.016:578.08(49.2)
Verslagen van de Technische Tarwe Commissie. XVI. De oriënteerende methoden ter bepaling van den bakaard van tarwe. (**Report of the Technical Commission on Wheat. XVI. The exploratory methods for determining the baking quality of wheat**).
Drukkerij Gebroeders Hoitsema N.V.—Groningen 1941 : 469–517.

The methods treated in this report, e.g. the Berliner and Koopmann determination and Pelshenke's

test, all relate directly or indirectly to gluten content and quality. Storage or damage of the grain affects the results of gluten tests.
Applications of the methods in various countries are described, together with the results obtained in Holland where large numbers of varieties and hybrids have been examined, frequently in connexion with breeding operations. The difficulties of identifying moderately good baking quality in highly vitreous grain are pointed out, with the recommendation that, for breeding purposes, wheats should be grown under conditions promoting the formation of starchy kernels. The breeding of a hard wheat equal to the ordinary Dutch varieties in yield etc. may be extremely difficult.

1231. 633.11.00.14(41.5)
633.491–2.411.4–1.521.6(41.5)

Field experiments, 1944.
J. Dep. Agric., Éire 1945 : **42** : 288–89.
Extensive trials of the wheat varieties Queen Wilhelmina, Pajbjerg, Yeoman II and Iron Master are reported.
Trials to compare the yielding and blight resistant capacities of the recently introduced potato Doon Éire with those of Kerr's Pink were conducted in all counties. In general Kerr's Pink was found to be more resistant than Doon Éire.

1232. Berg, S. O. 633.11.00.14(48.5)
Weibulls Ergovete. Resultat från prövning i officiella försök tillsammans med andra sorter 1930–1942. (**Weibull's Ergo wheat. Result from testing in official trials together with other varieties, 1930–1942**).
Agri Hortique Genetica, Landskrona 1944 : **2** : 43–62.
A summary is given of the extensive official tests of Weibull's Ergo wheat conducted by the Agricultural Experimental Institute and the agricultural societies during the period 1930–1942.

1233. Wagner, S. 633.11.00.14(49.4)
Sortenprüfungen bei Winterweizen. (**Varietal trials of winter wheat**).
Landw. Jb. Schweiz 1944 : **45** : 590–604.
The French variety Vilmorin 27 and the varieties Mont Calme 245 from Lausanne and Plantahof 3 from Zürich-Oerlikon were tested in five localities for quality and suitability for cultivation. All three were winter hardy. Marked differences were evident in resistance to lodging, Vilmorin 27 and Mont Calme 245 being superior to Plantahof 3. Vilmorin 27 and Mont Calme 245 were attacked by loose smut, Plantahof 3 only suffered slightly. Mont Calme 245 ripened earlier than the other two varieties and Plantahof 3 earlier than Vilmorin 27. Mont Calme 245 and Vilmorin 27 gave similar yields and higher than Plantahof 3. Mont Calme 245 and Vilmorin 27, though producing shorter stems, gave a higher yield of straw than Plantahof 3, an anomaly explained by the fact that the straw of Mont Calme 245 and Vilmorin 27 is so robust and thick that the weight is greater than that of the longer thinner straw of Plantahof 3. Vilmorin 27 gave a lower hectolitre weight than Mont Calme 245 or Plantahof 3, which showed almost equal values. The 1000 corn weight of Vilmorin 27 was the highest and that of Plantahof 3 the lowest for the three varieties. The grain of Plantahof 3 was harder than that of Mont Calme 245 and of Vilmorin 27. Grain hardness is markedly related to variety; the effect of locality on this property was only slight. The gluten content was highest for Mont Calme 245; Plantahof 3 had a higher value than Vilmorin 27. E. W.

1234. Couch, J. F.,
Naghski, J. and
Krewson, C. F. 633.12:581.192
Buckwheat as a source of rutin.
Science 1946 : **103** : 197–98.
An analysis of Japanese buckwheat has shown that its rutin content may exceed a value of 6%.

OATS 633.13

1235. Mulvey, R. R. 633.13–2–1.521.6(77.2)
A new era in oat production.
Circ. Ind. Agric. Exp. Sta. 1944 : No. 296 : Pp. 4.
Yield trials during 1941–3 of nine disease-resistant oat varieties are reported. Tama and Victland were the most productive varieties.

1236. Prince, F. S.,
Higgins, L. J. and
Blood, P. T. 633.13.00.14(74.2)
633.15.00.14(74.2)
Small grain and corn variety tests.
Stá. Circ. N.H. Agric. Exp. Sta. 1944 : No. 67 : Pp. 11.
Maize and oat trials are reported. Early maturing dent and dent-flint hybrids of field maize are recommended for use under New Hampshire conditions.

RYE 633.14

1237. Håkansson, A. 633.14:575.127.5·633.11:581.162.51
Some observations on the seed development in two strains of *Triticale*.
Acta Agriculturae Suecana, Stockholm 1946 : **1** : 377–84.
Seed development was studied in two strains of the amphidiploid rye x wheat hybrid ($2n = 56$), *Triticale* Rimpau (strain A) and a new strain designated 1944–0106. In the strain 1944–0106 rarity of fertilization was found to be the chief cause of low seed setting; the failure of the anthers to dehisce is suggested as the most probable cause of the infrequent fertilization. In both strains meiotic irregularities in the ovule were unimportant. Degeneration of the endosperm was observed in strain A, and probably also occurs in strain 1944–0106.

1238. Müntzing, A. 633.14:576.356.1
Cytological studies of extra fragment chromosomes in rye. III. The mechanism of non-disjunction at the pollen mitosis.
Hereditas, Lund 1946 : **32** : 97–119.
A description is given of mitosis in the pollen grains of rye strains carrying extra chromosome fragments. Standard fragments and large isochromosomes behave normally until the division of the centromere; thereafter chromatid separation is prevented by stickiness in a probably heterochromatic segment in the long arm. The chromatids fail to disjoin and pass together, usually to the generative pole. Non-disjunction was not observed in the small isochromosomes, which divided regularly.
The mode of origin of isochromosomes is discussed, the author favouring the theory that they arise by aberrant attachment of the chromatids to the recently divided centromere of a single chromosome. It is probable that chromosome fragments in rye are somewhat deleterious, since pollen tubes carrying them exhibit delayed development.

1239. Müntzing, A. 633.14:581.162.5:575.125
Double crosses of inbred rye.
Bot. Notiser 1943 : 333–45.
Single and double cross hybrids have been raised between inbred lines of the rye variety Stål (Steel). The crosses in general proved superior to open-pollinated plots of the parental variety in height, plant weight and kernel weight. Different combinations differed *inter se* in these and other characters; it was noticed that the F_2 generations were not inferior to the F_1. The double cross hybrids were self-fertile.

1240. Wellensiek, S. J. 633.14–1.557:581.02
Ras, zaaitijd en bemesting bij rogge. (**Variety, time of sowing and manuring in rye**).
Meded. LandbvoorlichtDienst, Wageningen 1944 : 145–52.
An experiment to demonstrate the effect of environmental factors upon varietal performance is recorded in detail.

1241. 633.14.00.14(48.9)
Foreløbig Meddelelse om Forsøg Rugsorter 1939–1941. (**Preliminary reports on experiments with varieties of rye 1939–41**).
Tidsskr. Planteavl. 1942 : **47** : 187–88. [327 Meddelelse. A.]
The performance in Danish trials of the Svalöf varieties Staal, Kongs and Kongs II during 1939–41 and of a new promising short strawed Petkus rye (Kortstraaet Petkus) and of Agro during 1939–40, is recorded.

1242. Hull, F. H. 633.15:519.24:575.41
Regression analyses of corn yield data.
Genetics 1946 : **31** : p. 219. (Abst.).
"Analyses of published data on yields of inbred and hybrid corn . . . show regressions of F_1 on inbred parent in groups of one constant parent to be generally positive. These partial regressions are large when the constant parent is a low yielding and approach zero when the constant parent is a high yielding line".

1243. Fogel, S. 633.15:575.113.3.061.6
Gene action and histological specificity of pigmentation patterns of certain *R* alleles.
Genetics 1946 : **31** : 215–16. (Abst.).
The specific action of the following alleles in determining the anthocyanin pigmentation in the different tissues of the maize plant has been investigated: *R*-pueblo, *R*-cornell, *r*-cornell and *r*-ch.

1244. Fogel, S. 633.15:575.113.3.061.6
Gene action and the course of anthocyanin synthesis in certain *R* alleles.
Genetics 1946 : **31** : p. 216. (Abst.).
The rate of anthocyanin synthesis in excised tissue sections of maize plants maintained on buffered glucose solutions has been determined for the alleles *R*-pueblo, *R*-cornell, *r*-cornell and *r*-ch (cf. Abst. **1243** above). With regard to the total amount of anthocyanin produced and the rate of formation, the alleles may be arranged in the following order of decreasing potency: *r*-ch, *R*-pueblo, *R*-cornell and *r*-cornell.

1245. Sprague, G. F. 633.15:575.12
Early testing of inbred lines of corn.
J. Amer. Soc. Agron. 1946 : **38** : 108–17.
The value of early testing of maize inbreds is discussed, and an account is given of the method of testing new lines for hybrid production at the Iowa Experiment Station. In this method open-pollinated varieties and single or double crosses are used as tester parents, and the plants are out-crossed to the tester at the time of the first selfing. The selected lines are again top-crossed and tested in the S_4 generation. In the experiments reported, S_0 and S_1 plants of a stiff-strawed synthetic variety were selfed and top crossed with Iowa Hybrid 13, a rather weak-strawed double hybrid, as tester. Highly significant differences were obtained between the yields of the S_0 top-crosses. The data show that the descendants of certain S_0 plants possessing high combining ability in the top-cross tests continued to give high yields in the S_1 top-crosses or in single cross tests of the S_3 lines. The correlation between lodging percentages in the S_0 and S_1 top-crosses was 0·98, indicating little value in repeated testing among families. Considerable segregation within families, however, occurred, suggesting the desirability of sufficient additional testing for lodging resistance. The view is expressed that early testing is valuable for testing yield and other readily estimated characters which depend upon a relatively high number of genes, but that the value of the method is more limited in the case of characters conditioned by a lower number of genes, such as lodging resistance.

1246. Hayes, H. K.,
Rinke, E. H. and
Tsiang, Y. S. 633.15:575.12:519.241.1
The relationship between predicted performance of double crosses of corn in one year with predicted and actual performance of double crosses in later years.
J. Amer. Soc. Agron. 1946 : **38** : 60–67.
Correlation coefficients were estimated to compare the performance of predicted double crosses in 1940 with the predicted performance in 1941, and to compare the predicted performance in 1940 and 1941, respectively, with the actual performance of the double crosses grown in 1943–44. The yield of a double cross was predicted by averaging the yield of four of the six possible single crosses that can be made from four inbred lines, the data on the parental single crosses not being used in the estimation (cf. *Plant Breeding Abstracts*, Vol. IV, Abst. 985). The characters studied included yield, moisture percentage at husking, kernel row number, ear length, ear height, plant height and date of silking.

1247. Curtis, J. J. and
Earle, F. R. 633.15:575.12:581.192(73)
Analyses of double-cross hybrid corn varieties produced on farms.
Cereal Chem. 1946 : **23** : 88–96.

An analysis has been made of the chemical composition of several maize hybrids grown in farm fields and at three experimental stations in 1941. Variations were found among the samples of all the constituents analysed. Oil content was primarily a varietal character. Further data are required before the relative influence of varietal and environmental factors upon the starch, sugar ash and protein contents can be determined. In every case, samples with a high protein content were low in starch content, and vice versa.

1248. Eyster, H. C. 633.15:575.125:519.24
Theoretical aspects of hybrid corn genetics and hybrid vigor.
Genetics 1946 : **31** : p. 215. (Abst.).

"Some interesting theoretical mathematical aspects have been worked out. These could be the basis for further research in an effort to learn more about the nature of hybrid vigour."
[Author's summary]

1249. Cárdenas, M. 633.15:576.16(8)
Consideraciones morfológicas y filogenéticas sobre algunas razas de maíz procedentes del Perú y Bolivia. **(Morphological and phytogenetical considerations on certain races of maize from Peru and Bolivia).**
Rev. Univ., Cuzco 1944 : **33** : No. 87 : 178–85.

Two Bolivian maize varieties, Magdalena and Chunchu, belonging to the Amazonian group, are contrasted in their morphological features with the variety Amarillo belonging to the large-grained Cuzco type.
Although finding himself in agreement with the hypothesis that places the centre of origin of maize in South America in the basin of the Río Paraguay, the author considers that a secondary centre of domestication is to be found in the Cuzco region of southern Peru. J. G. H.

1250. Giles, N. H. (jun.),
Burkholder, P. R.,
McVeigh, I. and
Wilson, K. S. 633.15:577.16:576.356.4:575.11
Comparative studies on the B-vitamin content of trisomic and disomic maize.
Genetics 1946 : **31** : 216–17. (Abst.).

The contents of niacin, riboflavin and thiamin in the leaf tissue of trisomic and comparable disomic plants of maize have been estimated. In general the average vitamin content was higher in the trisomics than in the disomics. The results indicate that an extra dose of any chromosome has some effect in increasing the content of the vitamins studied, although certain chromosomes are more important than others, suggesting that several genes may be involved in the production of each vitamin and that these genes are widely distributed in the chromosome complement. Furthermore, the fact that trisome 8 results in a considerable increase in total vitamin content suggests that chromosome 8 may carry genes conditioning certain basic processes common to the synthesis of all three vitamins.

1251. Laughnan, J. R. 633.15:581.192:575.11.061.6
Chemical studies concerned with the action of the gene A_1 in maize.
Genetics 1946 : **31** : p. 222. (Abst.).

It has been found that the *A* gene for pigmentation in maize controls the synthesis of a relatively large number of related chemical substances, in contradiction to the generally held view that this gene is concerned with a simple oxidation-reduction process producing isoquercitrin and chrysanthemin. Chemical analysis of the husk extracts of brown *aa B Pl* plants has established the presence of at least five phenolic pigments; these pigments are absent in purple *A B Pl* plants. The husk extracts from brown plants also contain two yellow pigments with the properties of flavonols, one of which is identical with isoquercitrin; both these yellow pigments are also present in husks from *A B Pl* plants but in considerably smaller amounts. The extracts of purple husks contain at least two purple pigments in addition to the anthocyanin chrysanthemin; and preliminary studies indicate the presence of others. The purple pigments are distinct from the brown and yellow pigments and are absent in the husk extracts of *aa B Pl* plants.

1252. Ellis, G. H.,
Randolph, L. F. and
Matrone, G. 633.15:581.192:576.356.5
A comparison of the chemical composition of diploid and tetraploid corn.
J. Agric. Res. 1946 : **72** : 123–30.

Tetraploid maize was found to have a higher nitrogen content than diploid maize in both the grain and stover; in the grain the average increase was 15%, while in the stover the average increase ranged between 20 and 34%. Ether extract, ash and crude fibre were similar in the tetraploid and diploid grains. Ether extract, ash and lignin contents were also similar to the tetraploid and diploid stover. The higher crude protein content of the tetraploid stover was accompanied by a corresponding decrease in the crude fibre and cellulose contents. The differences in chemical composition between the diploid and tetraploid forms is explained genetically by assuming that certain genes have a dosage effect, particularly the genes conditioning protein content, while others exhibit no such effect.

1253. Doty, D. M.,
Bergdoll, M. S.,
Nash, H. A., and
Brunson, A. M. 633.15:581.48:581.192:575.12
Amino acids in corn grain from several single cross hybrids.
Cereal Chem. 1946 : **23** : 199–209.

An analysis of the amino-acid contents in the grain of single cross maize hybrids indicates that the amounts of tyrosine, tryptophane, cystine, arginine and histidine are dependent upon the genetic constitution.

1254. Weatherwax, P. 633.15–1.524:575.11
Corn for morphological and genetic work.
Genetics 1946 : **31** : p. 235. (Abst.).

At Indiana University a collection of maize varieties grown chiefly by the Indians in Arizona, New Mexico, Central America, Ecuador and Peru, is reported. Future work on this material is planned, and the author states that suggestions will be appreciated.

1255. Dicke, F. F.
Jenkins, M. T. 633.15–2.7–1.521.6(73)
Susceptibility of certain strains of field corn in hybrid combinations to damage by corn earworms.
Tech. Bull. U.S. Dep. Agric. 1945 : No. 898 : Pp. 36.

Data on earworm damage in hybrid maize have been collected from various experiments carried out during the period 1935–42. The material observed included top crosses, and single and double crosses. The corn earworm, *Heliothes armigera*, was the chief pest, the army worm, *Laphygma frugiperda*, being only of minor importance as a rule. From the behaviour of all three types of crosses, certain inbreds could be distinguished as outstanding parents in transmitting ear qualities which reduce earworm damage. In general, strains with kernels of hard texture and with ears bearing husks that fit tightly round and over the ear tip and constrict the silks and extend a few inches beyond the ear tip, showed the least susceptibility to earworm damage. In the case of *Laphygma frugiperda*, a husk that dries early also reduced susceptibility. But the relative damage in the longer husked hybrids varied as much as the damage shown by the shorter husked hybrids, indicating that husk length is not the only factor determining resistance. Data from the double crosses indicated that for effective resistance at least three resistant inbreds should be included in the parentage.

1257. Dungan, G. H.,
Bigger, J. H.,
Lang, A. L.,
Koehler, B. and
Bolin, O. 633.15.00.14:575.12(77.3)
Illinois hybrid corn tests 1944.
Bull. Ill. Agric. Exp. Sta. 1945 : No. 509 : 455–84.

The 1944 co-operative hybrid maize tests in Illinois are reported. In addition to yield figures, data are given on reaction of varieties to several insect pests and diseases.

1258. Robinson, J. L. and Reiss, F. 633.15.00.14:575.12(77.7)
The 1945 Iowa corn yield test.
Bull. Ia Agric. Exp. Sta. 1946 : Bull. No. P79 : 600–42.
The results of the 1945 maize trials in Iowa are reported. Data are given on several characters in the case of each hybrid.

BARLEY 633.16

1259. Weibel, R. O. 633.16(75.4)
Winter barley in West Virginia.
Bull. Va Agric. Exp. Sta. 1944 : No. 314 : Pp. 27.
The rough-awned, smooth-awned and hooded types of winter barley are discussed with reference to maturity, hardiness, height, lodging, and yield trials at various locations. Notes are given on recommended varieties.

1260. Gustafsson, Å. 633.16:575.243
Drastic morphological mutations in barley.
Hereditas, Lund 1946 : **32** : 120–22.
Information is summarized on the fertility and yield of spontaneous and induced mutants of barley. In most cases, drastic mutation proves deleterious, although such forms may combine advantageously with other forms.

1261. Burnham, C. R. 633.16:576.312.34:537.531:575.243
A gene for "long" chromosomes in barley.
Genetics 1946 : **31** : 212–13. (Abst.).
In a plant of Mars barley produced by X-ray treatment "long" chromosomes were observed at metaphase I of microsporogenesis. The number of such chromosomes varied between none and six, the remaining chromosomes forming normal pairs. Two univalents were frequently observed at metaphase I, and lagging chromosomes and micronuclei at telophase I. It is suggested that the "long" appearance may be the result of failure of one of the two arms of a chromosome to be associated with its homologue. The character appears to be inherited as a recessive. The progeny of the single plant all showed a similar percentage of abortive pollen and the same cytological behaviour.

1262. Glick, D. 633.16:577.15:581.6
The enzymes of barley. Some recent contributions to our knowledge of their nature and properties.
Wallerstein Laboratories Communications 1941 : **4** : 20–24.
Papers published in the last three years dealing with the barley enzymes and their effect upon the malting process are reviewed. Reference is made to varietal differences in amylase activity.

1263. Tavčar. A. 633.16:581.46:575.11
The inheritance of the firmness of the spikelets on naked barley (*Hordeum sat. nudum*).
Poljodjelska Znanstvena Smotra, Zagreb 1944 : No. 8 : 41–56.
From the data obtained from nine crosses between lines of *H. sativum* var. *nudum* with firmly and weakly attached spikelets at the nodes, it is shown that spikelet attachment is determined by a single factor pair, designated *Ws ws*, the character of weakly attached spikelets being dominant. Investigations on the localization of the gene for spikelet attachment have revealed that the gene is not located in chromosomes I, II or IV. The valuable character of firmness of the spikelets can therefore be freely combined with the genes located in these chromosomes.

1264. Stamberg, O. E. and McBain, J. W. 633.16:581.6
The protein fractions of some barleys and malts.
Wallerstein Laboratories Communications 1942 : **5** : 35–39.
The protein fractions of the kernels and malts have been determined in the varieties Hannchen, Atlas, Wisconsin 38, Oderbrucker, Manchuria, and Velvet. Varietal differences in the fractions are reported.

1265. Briggs, F. N. and
Madson, B. A. 633.16:581.6:575(79.4)
The production and improvement of malting barley in California.
Wallerstein Laboratories Communications 1939 : No. 7 : p. 63. (Abst.).
A brief review is given of the work of improving malting barley in California. No variety superior to Coast was found in early investigations. California Tennessee Winter, Atlas and Hannchen are the chief types bred from Coast. The work of developing new, wilt-adapted malting barleys is being continued; one aim of the present work is to impart mildew and scald resistance to Atlas.

1266. 633.16:581.6:578.08
Methoden ter beoordeeling van gerst, mout en bier, vastgesteld door het Nationaal Comité voor Brouwgerst. (**Methods for the appraisal of barley, malt and beer, set up by the National Committee for Brewing Barley**).
Meded. Nat. Comité v. Brouwgerst, Wageningen 1936 : No. 2 : Pp. 21.

Methoden ter beoordeeling van gerst, mout en bier, vastgesteld door het Nationaal Comité voor Brouwgerst. (**Methods for the appraisal of barley, malt and beer, set up by the National Committee for Brewing Barley**).
Ibid. 1941 : No. 3 : Pp. 21.
The first booklet gives a brief description of the methods, officially approved by the Netherland National Committee for Brewing Barley, for testing the quality of brewing barley, malt and beer of home production. These methods are stated to comply closely with those officially adopted in Berlin.
The second booklet is a slightly revised second edition of the first. V. A.

1267. Tapke, V. F. 633.16–2.451.2–1.521.6:575(73)
New physiologic races of *Ustilago Hordei*.
Phytopathology 1945 : **35** : 970–76.
The identification of five new physiological races of *Ustilago Hordei* (Pers.) Lagerh. is reported in the United States. Among the eight differential varieties used, Pannier (C.I. 1330) showed promise as a foundation stock for breeding for resistance.
It shows marked susceptibility only to the uncommon races 4 and 10, and has also proved immune to all the known physiological races of *U. nigra*.

1268. Buchli, M. 633.16.00.14(49.4)
Anbauversuche mit Wintergerstensorten. (**Cultivation trials with winter barley varieties**).
Landw. Jb. Schweiz 1944 : **45** : 701–14.
During 1938–40, cultivation trials were made on seven plots at the Zürich-Oerlikon Research Station with the following barley varieties: Riniker, Heininger, Blätterkinder, Klettgauer Nos 1, 17 and 24, Strickhof, Argovia and Friedrichswerther. All showed almost the same degree of resistance to disease. Riniker, Weininger and Blätterkinder were very early ripening, Klettgauer Nos 1 and 17 were early, Klettgauer 24 was mid-early, Strickhof and Argovia were mid-early to mid-late and Friedrichswerther was mid-late to late. Riniker and Strickhof were the most resistant to lodging, followed by Blätterkinder, Klettgauer 17, Argovia and Friedrichswerther; owing to their low resistance, the varieties Weininger and Klettgauer Nos 1 and 24 seem to be scarcely worth cultivation. The best grain yields were obtained from Riniker, Strickhof, Argovia, Klettgauer 17, Friedrichswerther and Blätterkinder. The best straw yields were given by Strickhof, Weininger, Friedrichswerther and Klettgauer 24. The results showed the varieties Riniker, Strickhof and Argovia to be suitable for cultivation, and under special conditions, also, the variety Klettgauer 17. E. W.

MILLETS AND SORGHUM 633.17

1269. Li, H. W.
Li, C. H. and
Pao, W. K. 633.171:576.16:575.116.1
(Cytological and genetical studies of the interspecific cross *Setaria italica* x *S. viridis*).
Chinese J. Sci. Agric. 1944 : **1** : 229–48.
Setaria italica, the cultivated millet, was crossed with *S. viridis*, the wild foxtail; in both these species $n = 9$. Chromosome pairing in the F_1 appeared to be normal. The F_1 hybrid, however,

showed approximately 70% pollen sterility. With the exception of pericarp colour the F_1 hybrid resembled *S. viridis* in all the characters studied. The following 15 genes were identified in the F_2 and F_3: the complementary genes, *R* and *Vi*, for tawny buff seed-coat colour; the supplementary gene, *B*, for black seed-coat colour; *Y*, for yellow endosperm; the complementary factors, *S* and *H*, for seed shattering; *Ps*, for prostrate seedling; *P*, for purple plant colour; *In*, a gene intensifying the effect of *P*; Pr_1, Pr_2 and Pr_3, for purple bristle; *Br*, for brown anther colour; *W*, for white pericarp colour; and *Ga*, determining differential pollen tube growth. Evidence of the following linkage groups was obtained: (1) *In*, Pr_1 and Pr_2; (2) *B*, *Vi* or *R*, and *P* and Pr_3; and (3) *Ga*, *W* and *Br*. The other genes appeared to be independently inherited. It is concluded that *S. viridis* is most probably the immediate ancestor of *S. italica*.

1270. Hamilton, J. W. 633.174(73)
"Old faithful"....sorghum triple-threater.
Sth. Seedsman 1946 : 9 : No. 2 : 12, 40.

The variety Sumac 1712, a sorghum grown in south-western United States, is described, with particular reference to its performance in Oklahoma. The variety can be used for the production of forage, grain and syrup.

1271. Miller, C. C. 633.174:575.12(73)
Miller's Dwarfs: custom-built broom corn.
Sth. Seedsman 1946 : 9 : No. 1 : 12, 47.

The broom corn strain, Miller's Dwarf No. 8 developed from a cross between Scarborough Dwarf No. 7 and European Standard, is described. It grows about 5½ ft. tall, and produces a good bush with well-formed tips. The heads either grow entirely out of the so-called boot or grow nearly to the top of it, and thus do not become stained by plant lice or moisture accumulation. Miller's Dwarf No. 8 appears to be best adapted to areas where the standard broomcorns are grown. If sown in the regions where dwarf types are used, the crop must be given a fairly thick stand so that straight heads are produced.

1272. Karper, R. E. and
Quinby, J. R. 633.174:575.42(73)
Successful sorghums.
Sth. Seedsman 1946 : 9 : No. 3 : 11, 34, 46.

An account is given of the new variety, Early Hegari. This variety matures two weeks earlier than Hegari. It shows the various characters associated with early maturity, such as fewer leaves and smaller stalks, and gives good yields under adverse conditions. Early Hegari possesses a higher critical photoperiod than Hegari and is therefore more widely adapted. It is suitable for combine harvesting.

FORAGE GRASSES 633.2

1273. Kiellander, C. L. 633.21:575.127.2
En ny *Poa*-hybrid, *Poa palustris* L. x *Poa compressa* L. (**A new *Poa* hybrid, *P. palustris* L. x. *P. compressa* L.**).
Bot. Notiser 1944 : 363–72.

A pentaploid hybrid ($2n = 35$) is reported between *P. palustris* and *P. compressa*. It is intermediate between the parents in morphological characters.

1274. Müntzing, A. 633.21:576.312.35
Different chromosome numbers in root tips and pollen mother cells in a sexual strain of *Poa alpina*.
Hereditas, Lund 1946 : 32 : 127–29. (Abst.).

A sexual strain of *P. alpina* is described which usually has $2n = 14$ chromosomes in the vegetative tissues, but about 18 or 19 chromosomes in the pollen mother-cells.

1275. Håkansson, A. 633.21:581.163
Ergänzende Beiträge zur Embryologie von *Poa alpina*. (**Supplementary contributions to the embryology of *P. alpina***).
Bot. Notiser 1944 : 299–311.

Observations are reported on the embryological abnormalities encountered in various strains of *P. alpina*. These are discussed in relation to the incidence of apomictic reproduction.

1276. Smith, D. C. and Nielsen, E. L. 633.21:581.4:581.16:575
Morphological variation in *Poa pratensis* L. as related to subsequent breeding behavior.
J. Amer. Soc. Agron. 1945 : **37** : 1033–40.
Morphological studies have been made of the progenies of 45 strains of *P. pratensis* L. for four generations. Aberrant types showing sexual reproduction in predominantly normal, apomictic progenies might generally be expected to produce progenies with a relatively high number of aberrant plants in comparison with the normal sister plants, but exceptions were frequent, and the breeding behaviour of any particular family cannot be predicted with certainty. Selection for normal types and their propagation from seed was not found to have any marked effect in eliminating the tendency towards sexual reproduction, or of increasing uniformity.

1277. Nissen, Ö. 633.22:581.162.5:575.125
A possible explanation of increased vigour in sib-pollinated later generations after self-fertilisation.
Hereditas, Lund 1946 : **32** : p. 296. (Abst.).
It is suggested that the finding of Nilsson-Leissner that sib-pollinated strains of *Dactylis glomerata* are more vigorous than the inbreds, may be explained by a possible linkage between incompatibility and vitality genes.

1278. Myers, W. M. 633.22:581.162.51:575.11:575.182
Effects of cytoplasm and gene dosage on expression of male sterility in *Dactylis glomerata.*
Genetics 1946 : **31** : 225–26. (Abst.).
A type of male sterility dependent for its expression upon the interaction of a cytoplasmic condition and a dominant gene is reported in *Dactylis glomerata.*

1279. Nordenskiöld, H. 633.24:576.354.4:576.116:575.127.2
Cyto-genetic studies in the genus *Phleum.*
Acta Agriculturae Suecana, Stockholm 1945 : **1** : 1–137.
Cytogenetic studies of *Phleum pratense* L. ($2n = 42$), *P. nodosum* L. ($2n = 14$), *P. alpinum* (L.) Gaud. ($2n = 14$) and *P. commutatum* ($2n = 28$) were made to examine the relationships of the species. Attempts were made to cross the species in all possible combinations and reciprocally. Other hybrids were also studied, such as *P. nodosum* ($2n = 21$) x *P. pratense*, *P. alpinum* x 4*n* (*P. pratense* x *P. nodosum*) and *P. nodosum* x *P. commutatum* ($2n = 56$). In the work of hybridization, use was made of self-sterility, male sterility, and male sterility induced by cold treatment applied some days before flowering and by premature forcing; suitable times of flowering were secured by forcing or cold treatment. With the exception of the cross *P. pratense* ♀ x *P. alpinum* ♂ all the crosses were more or less readily effected.
It was found that *P. pratense*, *P. nodosum* and *P. alpinum* can be crossed with one another, provided the differences in the chromosome number of the functioning gametes are not too great. The incompatibility barrier is eliminated if the species with a low chromosome number form gametes with a high chromosome number, i.e. diploid or tetraploid gametes, which are able to pair with the *P. pratense* gametes. The hybrids generally showed both male and female fertility. *P. commutatum*, on the other hand, behaved predominantly as a diploid, and hybrids involving this species were as a rule highly sterile.
Regular bivalent pairing was observed in the four species. Cytological investigation of the various hybrids indicated that the three genomes of *P. pratense* pair normally with each other, suggesting that *P. pratense* is an autopolyploid. The three *P. pratense* genomes also pair readily with the genome of *P. nodosum*. The genome from *P. alpinum* pairs readily with the *P. pratense* and *P. nodosum* genomes; the *P. pratense* genomes appear, however, to be more homologous with the genome of *P. nodosum* than with that of *P. alpinum*. The tetraploid hybrids involving *P. commutatum* exhibited a somewhat irregular meiosis, and this species is considered to be an allotetraploid. The results are discussed with reference to the fact that no multivalents were observed in *P. pratense* material studied and also to similar cases of absence of multivalents in autopolyploids reported in work on other plant genera.
The geographical distribution of the four species was studied. Morphological examination of wild collection of *P. pratense* and *P. nodosum* was also carried out. The interspecific differences

observed were mainly quantitative, suggesting that the distinction between *P. nodosum* and *P. pratense* depends upon different degrees of polyploidy rather than other specific differences. The observations on the F_2 plants of the hexaploid hybrids between the triploid *P. nodosum* and *P. pratense* support the same hypothesis, since the plants closely resemble *P. pratense*. It is therefore concluded that *P. pratense* is most probably an autopolyploid which has arisen from a single species identical with or closely related to *P. nodosum*. It is further suggested that the four species can be grouped into one coenospecies.

1280. Burton, G. W. 633.266(73)
What about Bahia?
Sth. Seedsman 1946 : **9** : No. 2 : 15, 59, 62.
A discussion is given of six types of Bahia grass (*Paspalum notatum* Flügge).

1281. Burton, G. W. 633.266:582:576.312.35(75.8)
Bahia grass types.
J. Amer. Soc. Agron. 1946 : **38** : 273–81.
A number of strains of *Paspalum notatum* Flügge have been studied in Georgia, and classified into the following six types: Common, Wallace, Paraguay, Wilmington, Pensacola and Tampia Bahia. An account is given of each type, including data on winter hardiness. The chromosome number of Pensacola has been found to be $2n = 20$; in all the other types studied the chromosome number is $2n = 40$. J. G. H.

1282. Sodiro, R. A. and
Mille, L. 633.28:582(8)
Sertula florae ecuadorensis. Series 3ª. (**A garland of the Ecuadorian flora. 3rd series**).
Bol. Inst. Bot., Ecuador 1945 : **4** : No. 5 : 7–81.
The authors describe the grasses belonging to the tribes Agrostidae and Aveneae of Ecuador and the Galapagos Islands.

1283. Karper, R. E. and
Quinby, J. R. 633.282:575(76.4)
Five new hegaris.
Sth. Seedsman 1946 : **9** : No. 4 : 16, 48.
Breeding work in Texas has produced the following new hegari varieties for silage and forage purposes: Bonita or Little Hegari, (cf. *Plant Breeding Abstracts* XIII, Abst. 1123) Yellow, White, Double Dwarf and Standard Hegari. With the exception of Bonita, however, the varieties are not yet ready for general distribution and are to be subjected to further breeding. Yellow Hegari has been obtained by crossing Dwarf Yellow milo and hegari, and White Hegari by selecting for pure white seed-coat in hybrids between milo and hegari. The Double Dwarf Hegari is suitable for combine harvesting. Standard strains with a maturity similar to that of ordinary hegari have been selected from crosses between tall mutants of Early Hegari and hegari

1284. 633.285:576.312.35:581.163
Nygren, A. 633.285:576.16
The genesis of some Scandinavian species of *Calamagrostis*.
Hereditas, Lund 1946 : **32** : 131–262.
A valuable study has been made of the Scandinavian forms of the genus *Calamagrostis*, which includes both amphimicts and apomicts. *C. arundinacea*, *C. canescens*, *C. neglecta* and *C. varia* are tetraploid amphimicts; *C. epigeios* is an amphimict with four, six or eight chromosome sets. *C. chalybaea*, *C. purpurea* and *C. lapponica* are apomicts, the two latter species showing considerable range in chromosome number. Apomixis occurs in the hybrid progeny of the amphimictic parents *C. arundinacea* x *C. epigeios*.
C. purpurea has been synthesized by colchicine treatment of *C. canescens* and also by crossing *C. canescens* and *C. epigeios*.
The present distribution of these species is described in the light of their presumed phylogeny. Apomixis in the progenies of amphimictic parents is ascribed to the combination in the hybrid zygote of complementary genes determining apomixis.

1285. Soulier, E. J. 633.289:575.127.5:633.11
A composite perennial *Elymus*-wheat-*Agropyrum* hybrid.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1945 : **47** : 578–79.
Descriptions are given of two hybrid plants obtained by pollinating a sterile F_4 perennial *Triticum* x *Agropyron* hybrid with pollen from *Elymus giganteus*. The two hybrids resembled *E. giganteus* in general plant habit, rhythm of development, the creeping habit of the root system, and in leaf and stem structure. The chromosome number of the maternal hybrid was $2n = 48$, while that of the hybrid was $2n = 52$. Since $2n = 28$ in *Elymus giganteus*, it is inferred that an unreduced gamete of this species took part in the fertilization.

1286. Östergren, G. 633.289:576.312.35(48.5)
Note on *Elymus arenarius*.
Bot. Notiser 1942 : p. 99.
Northern Scandinavian specimens of this species are octoploid ($2n = 56$).

1287. Dillman, A. C. 633.289:576.312.35:582(73)
The beginning of crested wheatgrass in North America.
J. Amer. Soc. Agron. 1946 : **38** : 237–50.
The history of crested wheatgrass in North America is presented. Recent work has shown that the chromosome number of the type *Agropyron cristatum* S.P.I. No. 19536, is $2n = 14$, while that of "standard" *A. desertorum* is $2n = 28$, thus confirming the former view that the two types are distinct species. It also appears that the Fairway variety and S.P.I. No. 19536 are similar or identical strains of the same species.

1288. Keng, Yi-Li and
Kong, Pai-Chieh. 633.289:582(51)
New bamboos from Szechuan Province, China.
J. Wash. Acad. Sci. 1946 : **36** : 76–86.
Figures and descriptions are given of four new species and one new variety of bamboo, viz. *Sinocalamus distegius*, *S. farinosus*, *Bambusa rigida*, *Arundinaria pedalis* and *B. sinospinosa* var. *inermis*.

LEGUMINOUS FORAGE PLANTS 633.3

1289. Tysdal, H. M. 633.31:575(71+73)
Report of the Uniform Alfalfa Nurseries.
U.S. Dep. Agric., Agric. Res. Admin. Bur. Pl. Industr. Soils Agric. Engin. Beltsville, Maryland 1944 (1945) : Pp. 26. (Mimeographed).
The eighth annual report of the Uniform Alfalfa Nurseries presents the results of tests for the 1944 crop in the various states. Data are given on stand survival and forage yields. Under conditions of severe bacterial wilt infection the new varieties, Ranger and Buffalo, have shown marked superiority in both stand survival and forage yields over the standard varieties. Under the so-called summer-killing conditions these two new varieties are equal, if not superior, to most standard varieties. In the northern region, Buffalo showed greater cold resistance than Kansas Common.
Notes are included on diseases and leaf hopper yellowing in some of the states.
Useful tables give (1) the origin of the strains which have been entered in the Uniform Cooperative Alfalfa Nurseries during the period 1937–41, under A numbers; and (2) the history and origin of the clones distributed between the states in the co-operative improvement programme, under C numbers.

1290. Sinskaya, E. N. 633.31:576.356.5:582(47)
On the diploid species of yellow alfalfa.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1945 : **48** : 281–82.
The yellow lucerne growing in the north-western Caucasus has been found to be diploid ($2n = 16$), in contrast to the tetraploid species, *M. falcata*, widespread in the European Russian plain and Western Siberia. This diploid form has been classed as a separate species, viz., *Medicago quasifalcata*, on the basis of its chromosome number, geographical distribution, morphology, and behaviour in crossing with other diploid and tetraploid species. The yellow diploid lucernes from Daghestan and South Kazahstan, so far found growing only in small populations, are also described. These diploid forms have been provisionally grouped as a separate species, *M.*

difalcata. The diploid species of yellow lucerne are of interest in plant breeding. *M. quasifalcata* gives a heavier yield of fodder than *M. falcata* and is disease resistant; the Kazahstan yellow diploids show resistance to high temperature.

1291. Ham, W. E. and Tysdal, H. M. 633.31:577.16:632.7–1.521.6(78.2)
The carotene content of alfalfa strains and hybrids with different degrees of resistance to leafhopper injury.
J. Amer. Soc. Agron. 1946 : **38** : 68–74.

Lucerne strains and hybrids showing differences in susceptibility to leafhopper attack (*Empoasca fabae* Harris) were analysed for carotene content at different stages of growth. In general, plants with the least yellowing due to leafhopper injury were higher in carotene content than those severely yellowed. New growth was higher in carotene content than more mature growth. Strains and hybrids with a high leaf percentage contained more carotene than those with a lower leaf percentage; approximately 77% of the carotene content of the whole plant was found in the leaves. In the absence of leafhopper injury and at the same stage of growth, strains and hybrids were found to vary inherently in their carotene content. It is suggested that the breeder may improve the carotene content of lucerne by selecting for (1) resistance to leafhopper yellowing, (2) high leaf percentage, (3) retention of leaves and green colour which involves selection for resistance to all leaf diseases, and (4) strains with high carotene content.

1292. Singleton, H. P., Nelson, C. E. and Stanberry, C. O. 633.31–2.3–1.521.6(79.7) 633.31–2.111–1.521.6(79.7)
Alfalfa varieties under irrigation.
Bull. Wash. St. Agric. Exp. Sta. 1945 : No. 464 : Pp. 32.

A survey is presented of investigations on lucerne varieties grown under irrigation which have been conducted since 1921 at the Irrigation Branch Experiment Station, Washington. The Turkistan, common, variegated and non-hardy groups of varieties are discussed. Winter hardiness and reaction to bacterial wilt were found to be the chief factors influencing yield.

1293. Wexelsen, H. and Skaare, S. 633.321:581.162 633.321:581.162.3
Rødkløverens blomstring of bestøvning. (**Flowering and pollination of red clover**).
Tidsskr. Norske Landbr. 1940 : **47** : 53–67, 109–22.

A full account is presented of observations in Norway on flowering of red clover and the work of honey bees and three species of humble bee in pollination and fertilization.

1294. Atwood, S. S. 633.322:581.162.52:575.11
The behavior of the self-compatibility factor and its relation to breeding methods in *Trifolium repens*.
J. Amer. Soc. Agron. 1945 : **37** : 991–1004.

The behaviour of the S_f allelemorph determining self-compatibility in *Trifolium repens* has been further investigated (cf. *Plant Breeding Abstracts*, Vol. XII, Abst. 1094). The following conclusions have been reached:—In a heterozygous S_fS_x plant the S_f and S_x gametes are produced in approximately equal numbers, at least macrosporogenesis. When an S_fS_y plant is used to pollinate a plant bearing two other S alleles, the S_f pollen does not compete equally well with the S_x pollen.

When the heterozygous S_fS_x plant is used to pollinate a self-incompatible plant, (S_xS_y or S_xS_y) the S_x pollen does not function in spite of its association with S_f.

When an S_fS_x plant is crossed as the female parent with a self-incompatible S_xS_y plant, the S_f factor behaves as a partly dominant factor so that some seed is set. When S_xS_y pollen was used to fertilize the S_fS_x heterozygote, no homozygous S_xS_y plants were obtained, suggesting that the normal oppositional effect is not affected by the presence of S_f in the female parent in those crosses in which only part of the pollen is inhibited.

Homozygous S_fS_f plants were obtained by selfing or inter-crossing heterozygous S_f plants. The few homozygous S_f plants crossed with self-incompatible plants have imparted considerable vigour and good seed-setting capacity to their F_1 progenies. The possible utilization of the S_f factor in inbreeding is discussed.

1295. Hollowell, E. A. 633.327:581.143.26:575.12
"Dixie" does it....
Sth. Seedsman 1946 : **9** : No. 2 : p. 20.
The new crimson clover variety, Dixie, is described (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 613). It is a composite of equal proportions of three strains, viz., Allen, Hardy and Thornton. Dixie is a hard seeded variety and it produces good volunteer stands. This variety of crimson clover may be even more widely adapted than the common crimson clover.

1296. Weimer, J. L. 633.35–2.483–1.521.6(73)
A new species of *Colletotrichum* on vetch.
Phytopathology : 1945 : **35** : 977–90.
An account is given of an anthracnose leaf spot disease attacking vetches in Georgia, which has been named *Colletotrichum villosa*. *Vicia grandiflora*, *V. monanthos*, *V. angustifolia*, *V. pannonica*, and most strains of *V. sativa* were found to be fairly resistant to the disease.

1297. McKee, R. 633.364
Lespedeza culture and utilization.
Fmrs' Bull. U.S. Dep. Agric. 1940 (Revised 1946) : No. 1852 : Pp. 14.
An account is given of the three species, *Lespedeza striata*, *L. stipulacea* and *L. cuneata*, and their varieties.

1298. Stitt, R. E. 633.364:575.061.1:581.162.3
Natural crossing and segregation in sericea lespedeza, *Lespedeza cuneata* (Dumont) G. Don.
J. Amer. Soc. Agron. 1946 : **38** : 1–5.
A study has been made of the selfed and open pollinated progenies of a procumbent plant of *Lespedeza cuneata*. Both petaliferous and apetalous flowers occur in this species; the former type of flower is open-pollinated, the latter type self-pollinated. Both forms of flower were produced by the original procumbent plant.
The procumbent plants appeared to be homozygous for plant habit. Natural crossing of the procumbent plants with plants possessing the normal, more or less erect habit averaged 70·4%. Segregation for plant habit in F_2 lines derived from the selfed seed of F_1 plants with normal habit indicated a complex mode of inheritance of plant habit.

1299. McKee, R.,
Hyland, H. L. and
Ritchey, G. E. 633.367:581.6(73)
Preliminary information on sweet lupines in the United States.
J. Amer. Soc. Agron. 1946 : **38** : 168–72.
Data are given on non-alkaloid selections of blue (*Lupinus angustifolius* L.), yellow (*L. luteus* L.) and white (*L. albus* L.) lupins in respect of plant characters, maintenance of strain purity, seed yield, green manure yield and feeding value. The sweet selections of the yellow and blue species showed good vegetative growth and seed yield, but the sweet strains of white lupin were found to be less vigorous. A rapid method of determining the presence of alkaloid is described.

1300. Tome, G. A. and 633.374:576.312.35:576.356.5:576.16
Johnson, I. J. 633.374:581.162.5
Self- and cross-fertility relationships in *Lotus corniculatus* L. and *Lotus tenuis* Wald. et Kit.
J. Amer. Soc. Agron. 1945 : **37** : 1011–23.
Cytological and morphological data suggest that the two varieties of bird's foot trefoil known as the broad and narrow leaf types are distinct species. In the narrow leaf type designated *Lotus tenuis*, $n = 6$, and in the broad leaf type, designated *Lotus corniculatus*, $n = 12$. Morphological differences between the two species are similar to those usually observed between diploid and tetraploid forms. In view of these observations and the autotetraploid inheritance reported in *L. corniculatus* (*cf. Plant Breeding Abstracts*, Vol. XI, Abst. 553), the suggestion is made that this species arose as a natural autotetraploid of *L. tenuis*.
On the basis of the percentage pod set and the number of seeds per pod obtained by self-pollination, both types were found to be highly self-sterile. A high percentage pod set and large number

of seeds per pod were obtained by intraspecific cross-pollination in both types. Since *L. corniculatus* sets seed well, it would appear that the species has existed as a tetraploid for a comparatively long period, and had undergone natural selection for high seed production.
The method of insect pollination of *Lotus* is described.
In crosses between the two species, no seed was set. In the cross *L. tenuis* x *L. corniculatus* pod formation was almost equal to that in the intraspecific hybrids, but in the reciprocal cross hardly any pods were formed. The results are explained on the basis of the chromosome balance between the two species.
Experiments were carried out with the colchicine-induced autotetraploid of *L. tenuis*. The *L. tenuis* autotetraploid differed from *L. corniculatus* in leaflet or stipule shape, and resembled this species in pollen grain diameter and size of flower. In the cross *L. corniculatus* x autotetraploid *L. tenuis* a very high percentage pod set was obtained, but no normal seed was produced; in the reciprocal and the cross between autotetraploid and diploid *L. tenuis* no pods were found. It is suggested that the failure to obtain seed in crosses between *L. corniculatus* and the autotetraploid *L. tenuis* may be due to the chromosome differentiation which has taken place in the latter species.

ROOTS AND TUBERS 633.4

1301. Priebus, K. 633.42:581.143.7
Die Keimlingsfarbe bei Herbstrüben- und Kohlsorten als Mittel zur Sortenunterscheidung. (**Seedling colour in turnip and cabbage varieties as a means of varietal discrimination**).
Gartenbauwiss. 1944 : **18** : 27–31.

Descriptions are given of the types of seedling pigmentation found in varieties of turnip, cabbage, cauliflower, kale, Savoy cabbage, kohl-rabi and Brussels sprouts.

1302. Wang, C. M. 633.42–2.411.4:576.16:631.521.6(51)
(**Physiological specialization in *Peronospora parasitica* and reaction of hosts**).
Chinese J. Sci. Agric. 1944 : **1** : 249–57.

The reaction of Cruciferous host plants to downy mildew has been classified into four types: (1) susceptibility; (2) resistance, with large necrotic spots; (3) para-immunity, with slightly visible necrotic dots; and (4) immunity, with no visible symptoms. Three varieties of *Peronospora parasitica* are differentiated, viz., *P. parasitica Brassicae*, *P. parasitica Raphani* and *P. parasitica Capsellae*. In *P. parasitica Brassicae* six physiological forms have been identified by the differential reaction of *B. chinensis*, *B. oleracea*, *B. juncea* and *B. Napobrassica*. A key to the physiological forms is given.

1303. Lamprecht, H. and
Hertzman, N. 633.42–2.412.5–1.521.6:575(48.5)
Immuna II, ny mot klumprotsjuka mycket motståndskraftig stam av rova. (**Immuna II, a new strain of turnip, highly resistant to club-root**).
Agri Hortique Genetica, Landskrona 1943 : **1** : 31–33.

An improved type of the Immuna turnip, designated Immuna II strain No. 26, has been obtained from the cross (Marienlyst V x Redheaded Bortfelder) x Immuna. It has a more satisfactory root shape and higher dry matter content than the finger-and-toe resistant Immuna strain No. 8 produced in 1936, being similar in these characters to the generally cultivated variety, Pedigree Bortfelder.

1304. Krickl, M. 633.425–2.111–1.521.6:581.6
Zur Züchtung von frostwiderstandsfähigen und nicht holzig werdenden frühen Kohlrabi. (**The breeding of early kohlrabi for resistance to frost and freedom from becoming woody**).
Gartenbauwiss. 1944 : **18** : 185–203.

A description is given of the author's technique of breeding kohl-rabi for frost resistance and a reduced degree of lignification. The varieties used were Dvorsky's Genuine Prague, Dvorsky's Early Fine-Leaved, Prague, Triumph of Vienna and Rogglis Open-Air.

1305. LeClerg, E. L. 633.491:575(73)
Just around the corner: South's new seed potatoes.
Sth Seedsman 1946 : **9** : No. 2 : 11, 50.

Potato breeding in the Southern States, included in the national potato breeding programme, is

described. The preliminary work of selecting disease-resistant and widely-adapted seedlings has now been achieved.

1306. Perlova, R. L. 633.491:575.14:576.356.5:576.16
Production of the original species of the Chile autotriploid *Solanum maglia* Schlechtd. at Pamir.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1945 : **48** : 56–58.

The triploid species, *Solanum Maglia* Schlechtd., has produced seed balls containing a number of good seeds under the conditions in the Western Pamir region. The seedlings obtained proved to be diploids with a haploid chromosome number of 12 or 13. For three successive generations the diploids showed the essential morphological characters of the triploid parent, and were also stable in certain other characters, such as their high fertility and abundant tuber production; the diploids, however, had smaller size measurements. The hypothesis is put forward that *S. Maglia* is an autotetraploid derived from a diploid form.

1307. Lepigre, A.-L. 633.491:581.142
Essais d'égermage des pommes de terre par les vapeurs d'oxyde d'éthylène. (**Attempts at preventing potato sprouting with the vapour of ethylene oxide**).
Ann. Inst. Agric. Serv. Rech. Expériment. Agric. Algérie 1945 : **2** : No. 1 : 35–61.

Experiments have been conducted to discover the effect of various concentrations of ethylene oxide and sulphuric acid on the keeping capacity of the potato varieties Epicure, Arran Banner, Arran Luxury, Royal Kidney and Furor. Prevention of sprouting and the control of insect damage and putrefaction were the principal aims of the investigation.

1308. Podlipenko, F. 633.491:581.165(47)
(**How to transplant potatoes**).
Sovhoznoe Proizvodstvo (State Farming) 1945 : Nos. 4–5 : 23–25.

The propagation of potato varieties by means of the sprouts and haulms is claimed to result in the production of invigorated and genetically improved stock.

1309. LeClerg, E. L. 633.491:581.45:581.143.32:575.11
Genetic leaf roll of Irish potato seedlings.
Phytopathology 1945 : **35** : 877–78.

A genetically determined type of leaf roll has been observed in self-pollinated progenies of the seedling XL 72–1, and in four out of the six crosses made with this seedling as one parent. This leaf roll only occurred in seedlings grown from true seed in the greenhouse, plants grown in the field from tubers produced by these seedlings being free from the abnormality. It therefore differs from the non-virus leaf roll previously reported (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 905) which was observed only in field grown plants but not in the seedlings.
Katahdin, Earlaine and Sebec do not possess factors for the type of leaf roll described, which appears to be due to a recessive factor.

1310. Stevenson, F. J. 633.491–2–1.521.6:575(73)
Breeding potatoes resistant to disease.
Nat. Hort. Mag. 1946 : **25** : 18–28.

An account is given of potato breeding in the United States, with particular reference to disease resistance. A short account of early improvement work is included.

1311. 633.491–2–1.521.6:575(74.1)
Potatoes.
Bull. Me Agric. Exp. Sta. 1945 : No. 438 : 505–602.

An account is included of the breeding and selection work carried out by the Maine Agricultural Experiment Station for resistance to bacterial ring rot, leaf roll, net necrosis, stem-end browning and late blight.

1312. 633.491–2.3–1.521.6(49.2)
Schurftziekte bij aardappelen. (**Scab in potatoes**).
Dep. Econ. Zaken Direct. Landb. 'S-Gravenhage 1939 : Pp. 118.

This monograph has been produced as a result of collaboration between the Laboratorium voor Mycologie en Aardappelonderzoek, the Rijkslandbouwproefstation te Groningen, the Instituut

voor Plantenveredeling and the Plantenziektenkundig Dienst at Wageningen, and various experts. It presents the results of research on aspects of the problem of scab in potatoes, including (1) a contribution by the late Prof. C. Broekema of the Instituut voor Plantenveredling on the resistance of various races of potatoes, and (2) detailed information and instructions on grading scab damage and how to carry out such examinations.

1313. 633.491–2.411.4–1.521.6
Åtgärder för bekämpande av bladmögel och brunröta hos potatis. (**Measures for combating blight and brown rot in potatoes**).
Flygbl. Växtskyddsanst., Stockh. 1945 : No. 70 : Pp. 8.
The terms blight (affecting the foliage) and brown rot (affecting the tubers) are both used in Sweden to designate potato blight.
Reports from Swedish potato growers on the blight resistance of varieties grown in Sweden and observations by officials of the Plant Protection Institute are used as the basis of a brief summary of resistant and susceptible potatoes. Earliness is generally accompanied by greater susceptibility.

1314. Reddick, D. and Peterson, L. C. 633.491–2.411.4–1.521.6:575.127.2(74.7)
Empire—a blight resistant variety.
Amer. Potato J. 1945 : **22** : 357–62.
The new blight resistant variety Empire has been derived from a cross between Rural New Yorker No. 2 and a hybrid seedling. *S. demissum* Lindl. was involved in the parentage of the latter. In the 1945 yield tests where blight was an important factor, Empire gave double the yield of the standard variety. It is drought tolerant, and produces large white-fleshed tubers with good culinary qualities. The new variety may be expected to do well in those districts where Rural New Yorkers have been the standard.

1315. Björling, K. 633.491–2.412.5–1.521.6
Fältförsök med potatiskräfta år 1944. (**Field trials on potato wart disease 1944**).
Växtskyddsnotiser 1944 : No. 6 : 81–84.
Fifteen new numbered varieties of potatoes bred at Svalöf were tested in the field for wart resistance. Fourteen had already reacted in the laboratory as immune, and the remaining one as slightly susceptible.
Ultimately immunity was confirmed for thirteen varieties. The fourteenth, though relatively tolerant carried mature spores of the fungus and was therefore classed as susceptible.
The need is pointed out for using field trials as well as laboratory tests in such work.

1316. Knudsen, V. E. 633.491–2.412.5–1.521.6(48.9)
Forsøg med Kartoffelsorter 1937–41. (**Experiments with varieties of potatoes 1937–41**).
Tidsskr. Planteavl. 1942 : **47** : 143–70.
This is a report on Danish trials which included wart resistant and wart susceptible varieties. The origin, main characteristics and performance of the varieties tested, which included Flava, Kaiserkrone, Juli, Alpha, Prisca, Goldwährung, Bintje and some well-known English varieties, are described.

1317. Adams, J. B. 633.491–2.7–1.521.6(71)
Aphid resistance in potatoes.
Amer. Potato J. 1946 : **23** : 1–22.
A review is given of literature on resistance to insects in several crops.
Tests were conducted during the period 1938–45 on the reaction to aphid attack of *Solanum tuberosum* varieties and five other *Solanum* species. The aphids used in all tests belonged to the species *Myzus persicae* Sulzer. The varieties and species tested were classified into four groups, viz., very susceptible, susceptible, tolerant and very resistant. The reaction of 115 varieties and species to aphid attack is summarized in a table. Katahdin typified the very susceptible group. Houma, Up-to-Date, Epicure, the blight resistant Fredericton seedling No. 996-1–4 (a second back-cross of the hybrids *S. demissum* x Katahdin to Katahdin), Sequoia, *S. chacoense*, *S. Commersonii* and *S. polyadenium* fell into the very resistant class.

The value of breeding for aphid resistance and the possible causes of such resistance are discussed. Attention is drawn to the fact that similarity has been observed between the results of investigations on aphid resistance and those on leaf hopper resistance.

1318. Willigen, A. H. A. de and Reestman, A. J. 633.491.00.14(49.2)
Rassenproeven met fabrieksaardappelen in 1943. (**Variety tests of industrial potatoes in 1943**).
Versl. Landbouwk. Onderzoek. 1945 : No. 50 (11) B : 619–53.

Work carried out by the Committee in Groningen for the study of Potato Starch (Aardappelmeel Studie Commissie te Groningen) forms the basis of this report which gives the results of chemical analyses of nine Dutch and German approved varieties of potatoes in 17 field experiments in 1943. The Dutch varieties included Gloria, Matador, Record and Triumf, and the German Voran and Hellena.

Gloria ranked first in starch production and starch quality. Record showed high protein content. The varieties Record and Matador, both from the same breeder and derived by crossing the same parents, Trenctria and Energie, showed points of resemblance in their chemical composition. Helena, Wilpo, Eigenheimer and Voran had a high phosphoric acid content, Matador and Triumf a very low one.

Eigenheimer showed low fibre content; it may be excluded from the officially approved varieties as being insufficiently resistant to wart.

The significance of fibre content is considered in relation to starch production. A simple method of determining the size of the starch grains was devised.

1319. Neuweiler, E. 633.491.00.14(49.4)
Kartoffelanbauversuche der Vereinigung schweizerischer Versuchs- und Vermittlungsstellen für Saatkartoffeln. (**Potato cultivation experiments of the Swiss Association of Research and Distribution Centres for seed potatoes**).
Landw. Jb. Schweiz 1944 : **45** : 865–89.

From 1938–1943 the main cultivation trials were carried out with 31 varieties of potatoes, including foreign varieties and a second series of trials was made with 13 varieties in mountainous localities. Eating and cooking qualities were recorded. The main trials lasted three years and the second series two or three years.

Frühmölle surpassed all the other early varieties in yield. Flava gave the highest yield of the mid-early varieties, Frühbote and Apulia being also notable. Prisca and Sickingen showed the best yields among late varieties. Amongst the table varieties, Edelgarde gave the highest yield. The early varieties are especially prone to tuber diseases, but the late varieties Industrie, Kapro and Katahdin are also affected.

The early and mid-early varieties showed on an average a higher nitrogen content than the late varieties. All the varieties were resistant to wart disease, except Industrie.

Of the fodder potatoes Rubingold gave the highest yield.

The foreign varieties suffered severely from virus diseases. Flava was most resistant. The best in yield were the mid-early English varieties Arran Banner and Dunbar Standard; Flava also gave a good yield and showed only slight degeneration. Amongst late varieties Kapro had the best yield.

In the two-year trials in the mountain districts of Elm, of the five varieties tested, Voran showed the highest yield; Allerfrüheste Gelbe was also very satisfactory and Ackersegen was good.

Three-year trials in the mountainous localities of the Lower Engadine showed that none of the ten varieties planted was affected by the high locality. Ackersegen gave the highest yield, and the yields of Sabina, Industrie and Voran were satisfactory. There were few diseased tubers in any of the varieties in these trials. E. W.

1320. Ezell, B. D. and Wilcox, M. S. 633.492:577.16
The ratio of carotene to carotenoid pigments in sweet-potato varieties.
Science 1946 : **103** : 193–94.

Information is presented on the carotene and total pigment content of the tubers of sweet potato varieties.

1321. BALLARD, W. W. 633.51(75.8)
Empire....crown prince of cotton.
Sth. Seedsman 1946 : **9** : No. 3 : 15, 32, 44.
In tests during the period 1942–5 conducted by the Georgia Agricultural Experiment Station, Empire has ranked first in comparison with commercial varieties for the following characters; thrips resistance, earliness, boll size, lint per boll, ginning out-turn, fibre strength and acre yield of lint. Its staple length is similar to that of Stoneville 2B and Coker 100. In lint percentgae Empire ranked as second. Wilt resistant strains of Empire were identified in 1944.

1322. ROBERTS, I. 633.51:575(76.2)
Cotton....stronger than steel.
Sth. Seedsman 1946 : **9** : No. 4 : p. 15.
A brief account is given of the Bobshaw cotton, produced at the Bobshaw Chemurgic Plantation, Heathman, Mississippi. The cotton is very fine and has considerable tensile strength.

1323. POPE, O. A. and
WARE, J. O. 633.51:581.6(73)
Effect of variety, location and season on oil, protein and fuzz of cotton-seed and on fiber properties of lint.
Tech. Bull. U.S. Dep. Agric. 1945 : No. 903 : Pp. 41.
The oil and protein contents and percentage of fuzz have been found to be varietal characters basically. Studies on fibre properties showed that in the determination of fibre length, tensile strength, and weight per inch of fibre, the genetic constitution is the chief factor, although environmental factors must also be considered in estimates of varietal differences. The percentages of immature fibres depended largely on conditions during growth, although varietal differences were shown.

1324. WOUTERS, W. 633.51:582:631.524(49.3)
Au sujet du spécimen-type de *Gossypium obtusifolium* Roxb. (**Regarding the type specimen of *G. obtusifolium* Roxb.**).
Bull. Jard. Bot. Brux. 1945 : **17** : 245–51.
The type specimen of *G. obtusifolium* Roxb. has been located in the herbarium of the State Botanic Garden at Brussels.

1325. SCHAD, C.,
HUGHES,
MAYER, R. and 633.52:581.6(44)
MENERET, G. 633.854.54:581.6(44)
Recherches sur le lin en 1940. (**Researches on flax in 1940**).
Ann. Phytogénét., Paris 1941 : **7** : 109–41.
This survey includes detailed information on the botanical characters and fibre quality of the flax varieties of central France; attention is also paid to the characteristics of linseed varieties and types of value both for fibre and oil production.

1326. CRANE, J. C. and
ACUNA, J. B. 633.525.1(72.91)
The comparative evaluation of fourteen types of ramie under Cuban conditions.
J. Amer. Soc. Agron. 1946 : **38** : 152–67.
The growth and fibre production of *Boehmeria utilis*, *B. japonica*, and 12 types of *B. nivea* have been investigated at the Cuban Agricultural Experiment Station. The de Francia type of *B. nivea* gave the highest yield of total green weight per plant for the three crops harvested during the season, followed by Americana, *B. japonica* and *B. nivea*. Types de Francia, C and A yielded the highest weights of defoliated stems. Type C gave the highest yield of fibre per acre, de Francia the second and type D the third highest. Americana had the highest number of stems, but was the shortest growing form. It is therefore suggested that breeding and selection work should aim at combining the growth habits of Americana with the vigour and high fibre production of types de Francia, C or D. The fibre from Americana was graded as the finest in texture; de Francia ranked second for this character, and C third. The highest average percentage of fibre of the green weight of the defoliated stems was given by type D.

1327. Lauritzen, J. I.
Brandes, E. W. and
Matz, J. 633.61:581.143.26.03
Influence of light and temperature on sugar-cane and *Erianthus*.
J. Agric. Res. 1946 : **72** : 1–18.

An analysis has been made of the effect of relatively low light intensities at temperatures between 60° and 86° F. upon the growth and survival of varieties of *Saccharum* and *Erianthus* species. Marked varietal response to different conditions of light and temperature were observed, indicating the possibility of obtaining considerable adaptability by breeding and selection. In general, at a given temperature, the health of the plants improved and growth increased with increased light intensity. For each temperature there exists a minimum light intensity for plant survival, health and growth.

The higher the temperature the higher is the minimum light required. In the experiments reported varietal growth response appeared to be unrelated to the latitudes in which the varieties originated. It is pointed out that this may be attributable to environmental conditions artificially set up in the experiments, in particular the deficiency of light in most of the experiments.

1328. Keller, A. G. 633.61:581.6(76.3)
Milling tests of C.P. 36–105.
Sug. Bull. N.O. 1946 : **24** : 97–98.

Milling tests of the new cane C.P. 36–105, released in 1945, are reported. The variety has a high fibre content and low normal extraction. In general the variety ground satisfactorily, and should present no milling problems not already encountered in grinding C.P. 34–120, a similar type of variety.

1329. Beauchamp, C. E. 633.61:581.6:578.08(72.91)
The upper and lower Brix of sugar cane as an index of its maturity.
Proc. 18th Annu. Conf. Asoc. Tecn. Azucareros, Cuba 1944 : 15–34.

It was found that on the basis of a given Brix value the ratio between the upper and lower Brix of the cane indicates the degree of cane ripeness. The data also suggest that the earlier a variety matures or forms juices of high purity, the greater is its capacity to resist drought and produce high sugar yield, for the following reason. Drought prevents the formation of sucrose but may cause increase in the Brix owing to the dehydration of the juice; but if the purity is already high, as in an early maturing variety, it remains high should drought conditions subsequently occur, so that the sugar yield is unimpaired.

1330. Cross, W. E. 633.61–2.451.2–1.521.6(82)
El efecto del "carbón" en las cañas de distintas variedades durante el año agrícola 1944–1945. (**The effect of smut on the canes of different varieties during the agricultural year 1944–45**).
Bol. Estac. Exp. Agric. Tucumán 1945 : No. 55 : Pp. 31.

Further information is presented on the varietal resistance of sugar cane to smut; most of the information relates to Tucumán seedlings. Varieties are classified under three headings: immune, slightly susceptible and seriously susceptible (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 1086).

1331. Boonstra, A. E. H. R. 633.63:575(49.2)
De veredeling van de suikerbiet, gezien in het licht van nieuwe enderzockingen. (**The improvement of the sugar beet, viewed in the light of new investigations**).
Institute of Plantbreeding, Wageningen, Holland 1941 : Pp. 3.

Boonstra, A. E. H. R.
Rasverschillen bij bieten. V. Het verband tusschen de hoeveelheid drogestof, suiker, strikstof, aschbestanddeelen en water bij ons bietensortiment. (**Race differences in beets. V. The relation between the amount of dry matter, sugar, nitrogen, ash and water in our beet collection**).
Meded. Inst. Suikerbiet., Bergen-o.-Z. 1940 : No. 8 : 301–24.

In an analysis of the experimental findings in sugar beet improvement up to the present time, the author suggests that the sugar beet cannot be regarded as having evolved from the fodder

beet, though both may have passed through similar stages as regards sugar content; if the custom of expressing the sugar content as a percentage of the dry weight is rejected, the increasing sugar content of a series such as Productiva, Hautana, Eureka (all three fodder beets), Friso and Kuhn P (both high-grade sugar forms) can be shown to be due to a fall in water content, and the sugar type is therefore primarily a dry beet, as compared with the fodder type.
The high positive correlation between water and ash content further strengthens the evidence indicating the actual trend of selection has been towards a beet containing less water and less ash and therefore more suitable for the purpose of manufacture, whereas the actual sugar forming capacity has not been materially altered.
The second report treats the same question from a slightly different angle.

1332. DECOUX, L.,
VANDERWAEREN, J. and
SIMON, M. 633.63:575(49.3)
Is de verbetering der beet mogelijk in oorlogstijd? (**Is it possible to improve beet in war-time?**)
Publ. Belg. Inst. Verbetering der Beet, Tienen-België **1943** : **11** : Pp. 32.
Section IV of this paper demonstrates the great importance of the choice of varieties in raising yields.

1333. BOONSTRA, A. E. H. R. 633.63:581.143.26:575(49.2)
Grootere opbrengst bij bieten door verlenging van den groeiduur. (Larger yield from beets by lengthening the growing period).
Meded. Inst. Suikerbiet., Bergen-o.-Z. 1941 : No. 3 : 29–48.
Though on a small scale, the experiments recorded indicate that early sowing and a longer growing period results in bigger yields, probably because the sugar beet plants have developed enough foliage by mid-summer to utilize the strong sunshine. To prevent the bolting which so often results after early sowing, races resistant to this defect must be bred. The breeder must select for a type that, not only does not bolt, but also develops rapidly after sowing.

1334. GINNEKEN, P. J. H. VAN 633.63:581.192:578.088
De onderscheiding van suikerbietenrassen op grond van de minerale samenstelling van loof en wortel. (**How to distinguish sugar beet strains by the mineral composition of leaf and root**).
Meded. Inst. Suikerbiet., Bergen-o.-Z. 1940 : No. 6 : 179-276.
This elaborate study of data from experimental and farm fields over a series of years is accompanied by numerous graphs and tables illustrating the author's special method of analysis of the differences between the strains.

1335. FIFE, J. M. and
CARSNER, E. 633.63–2.19–1.521.6(79.4)
Tip burn of sugar beet with special reference to some light and nitrogen relations.
Phytopathology **1945** : **35** : 910–20.
Factors causing the physiological tip burn disease of sugar beets have been investigated. Genetic constitution appears to be a factor in the reaction of sugar beets to the environmental influences conducive to the disease. More cases of tip burn have been found among the field type varieties such as U.S. 14, than among the sugar type varieties such as U.S. 15.

1336. BJÖRLING, K. 633.63–2.482–2.421.9:582
Pleospora betae n. sp., die Schlauchfruchtform von *Phoma betae* (Oud.) Fr.
[***P. betae*, n. sp., the ascigerous form of *Ph. Betae* (Oud.) Fr.**].
Bot. Notiser 1944 : 215–22.
The perfect form of *Ph. Betae* has been discovered and described as *P. Betae*.

1337. GIDDINGS, N. J. 633.63–2.8–1.521.6
Some factors influencing curly top virus concentration in sugar beets.
Phytopathology **1946** : **36** : 38–52.
In a study of the relationship between resistance to curly top virus and the concentration of the virus in the resistant variety S.L. 68 and the susceptible variety S.L. 842, virus concentration was found to be much greater in infected susceptible plants than in infected resistant plants.

1338. Giddings, N. J. 633.63–2.8–1.521.6
Mass action as a factor in curly-top-virus infection of sugar beet.
Phytopathology 1946 : **36** : 53–56.
The evidence from a study of the varieties S.L. 68 and S.L. 842 suggests that the active mass of virus is an important factor in virus resistance.

1339. Bennett, C. W.,
Carsner, E.,
Coons, G. G. and
Brandes, E. W. 633.63–2.8–1.521.6(82)
The Argentine curly top of sugar beet.
J. Agric. Res. 1946 : **72** : 19–48.
Investigations on the Argentine curly top disease, which is transmitted by the leaf hopper *Agalliana ensigera*, included limited varietal tests of resistance. S.L. 68 exhibited most resistance, followed by U.S. 11 and U.S. 12. R. and G. Old Type proved to be most susceptable variety. This order of resistance is similar to that shown by the varieties in their reaction to North American curly top.

STIMULANTS 633.7

1340. Rave, L. 633.71(43)
Die wichtigsten Varietäten der Tabakpflanze. (**The most important varieties of the tobacco plant**).
Acta Nicotiana, Berlin 1939 : **1** : 228–32.

Rave, L.
Die Deutschen Tabaksorten. (**The German tobacco varieties**).
Ibid. 1939 : **1** : 233–38.
Descriptions are given in tabular form of the principal German tobacco varieties.

1341. Benincasa, M. 633.71(45)
Le principali varietà di tabacco cultivate in Italia. (**The principal varieties of tobacco cultivated in Italy**).
Acta Nicotiana, Berlin 1939 : **1** : 169–206.
Descriptions are given of the following tobacco varieties cultivated in Italy: Meticcio di Cava, Burley di Pontecagnano (= American Burley), Tombac, Kentucky, Virginia Dark, One Sucker, Salento, Moro di Pontecorvo, Kentucky Italia, Kentucky Gentile, Kentucky Gigante No. 2, Virginia Hybrid "B," Burley Giuseppina, Burley di Gran Reddito "B", Picentino Benincasa, Virginia Bright Leaf, Slate's Improved Gold Leaf, Bright Italia Marca "B", Brasile del Grappa (= Brazil Bahia), Brasile Goyana, Root-Rot Resistant Havanna, Round Tip, Big Cuban, Big Havana, Hybrid No. 4, Xanti Yaka, Perustitza Normale, Perustitza Gigante, Samsun No. 3, Trapisoum, Herzegovina 136, Abruzzi Samsun, Herzegovina and Virginia Extra Scafati (= Bright Italia Marca "A" No. 16).

1342. Gornik, R. 633.71(49.7)
Die Tabaksorten Jugoslawiens. (**The tobacco varieties of Jugoslavia**).
Acta Nicotiana Berlin 1939 : **1** : 207–19.
Descriptions are given of the following Jugoslav tobacco varieties: Yaka, Prilep, Žitkovac, Kruševac, Tanče, Ravnjak, Segendinska Ruža, Debrecin and Tisa.

1343. Arghirescu, V. 633.71(49.8)
Les variétiés des tabacs Roumains. (**The Rumanian tobacco varieties**).
Acta Nicotiana, Berlin 1939 : **1** : 155–68.
Descriptions are given of the Rumanian tobacco varieties Dragaschani, Molovata, Ghimpatzi, Ialomitza and Sătmărean, also of various introduced American forms.

1344. Poddubnaja-Arnoljdi, V. A. and
Lodkina, M. M. 633.71:575.127.2:581.3
(Embryogenesis in hybridization of distant species and polyploidy in the genus Nicotiana).
Botaničeskii Žurnal (J. Bot. U.R.S.S.) 1945 : **30** : 195–216.
Taking the development of the embryo and endosperm as the criterion of successful hybridization, the writers have made a study of the causes of the different results encountered in interspecific

crosses in *Nicotiana*. In the introduction the results of a study of embryogenesis in *N. rustica* (*2n* and *4n*), *N. paniculata*, *N. glauca*, *N. Tabacum*, *N. silvestris*, *N. longiflora* (*2n* and *4n*), *N. ruta* (the amphidiploid from *N. rustica* x *N. Tabacum*) and *N. rupa* (the amphidiploid from *N. rustica* x *N. paniculata*) are described in detail.

The amphidiploids *N. ruta* and *N. rupa* are mentioned as showing normal fertility and behaving like completely established species.

In general it was found that the rate of development of embryo and endosperm in *Nicotiana* species is related to their floral morphology, i.e. in species with a short pistil and corolla tube with not very large flowers, e.g. *N. rustica*, *N. paniculata*, *N. ruta* and *N. rupa*, embryogenesis is more rapid than in species with a long pistil and corolla tube and large flowers, e.g. *N. Tabacum*, *N. silvestris* and *N. longiflora*. This difference is an important factor in regard to hybridization, species with a similar floral type being more successful in crossing than species differing in their floral morphology. The length of the interval between pollination and fertilization depends, not only on the length of the passage along which the pollen tube must pass, but also on its capacity to grow at a certain suitable rate. This is demonstrated by a comparison of the initial stages of the crosses *N. silvestris* x *N. glutinosa*, *N. silvestris* x *N. Tabacum* and *N. silvestris* x *N. silvestris*, in which the *N. silvestris* pollen tubes which are the longest and grow the most rapidly, reach the egg cell of *N. silvestris* and effect fertilization sooner than the pollen tubes of *N. Tabacum* or, especially, *N. glutinosa* with their shorter and slower growing pollen tubes.

Still more important factors in the success of interspecific crosses of *Nicotiana* and other genera are the genetic, physiological and biochemical characteristics of the species concerned. The species must not be too remotely related genetically. The species of *Nicotiana* in general cross readily within their respective sections, while species belonging to different sections may cross with difficulty or not at all, the latter eventuality being due not so much to differences in chromosome number and floral morphology as to remote genetical relationship and the physiological features of the species concerned; and this may be the case even within a section, e.g. the crosses *N. Tabacum* (*2n* = 48) x *N. glutinosa* (*2n* = 24) and *N. glutinosa* (*2n* = 24) x *N. silvestris* (*2n* = 48) are effected with difficulty, while the combinations *N. silvestris* x *N. glutinosa* and *N. glauca* (*2n* = 24) x *N. paniculata* (*2n* = 24) cannot be effected.

The views of other investigators on the genetic relationship between various species of *Nicotiana* are cited.

Instances are also cited from the authors' own experiments, in which (1) species with the same chromosome number crossed either with difficulty or not at all, and (2) in which the cross was more readily made when the pollen parent had a higher chromosome number than the pistillate parent, e.g. in *N. paniculata* x *N. Tabacum*, *N. glutinosa* x *N. rustica* (*2n* = 48), *N. rustica* x *N. ruta* (*2n* = 96) and *N. paniculata* x *N. glauca*.

Embryogenesis was studied in different interspecific crosses as well as in amphidiploids and autotetraploids. The hybrid combinations included (1) species differing in length of pistil and in chromosome number; (2) species similar in length of pistil but differing in chromosome number; (3) species differing in length of pistil but with the same chromosome number; and (4) species similar in length of pistil and chromosome number. It was found that in group (1) development of the embryo and endosperm usually proceeds more satisfactorily and rapidly where the pistillate parent has the shorter pistil, regardless of whether the pollen parent has a lesser or greater number of chromosomes; in group (2) that results were usually more successful where the pistillate parent had the higher chromosome number, e.g. *N. rustica* x *N. paniculta*, as compared with the reciprocal; in group (3) that crosses were more successful where the pollen parent had the longer pistil; in group (4) that the cross was sometimes more successful in one direction and sometimes in the other; in this group it is of interest that, in the cross of *N. paniculata* x *4n N. glauca*, development of embryo and endosperm was more rapid than in *2n N. paniculata* x *2n N. glauca*. The latter combination was a failure owing to their being genetically remote species, though belonging to the same botanical section.

Descriptions are given of the irregularities that occur in unsuccessful crosses.

1345. GOODSPEED, T. H. 633.71:576.16:575.127.2(8)

A fifth species of *Nicotiana* from Peru.

Rev. Univ., Cuzco 1944 : **33** : No. 87 : 65–70.

The discovery of a new *Nicotiana* species, *N. Arentsii*, is reported from south-western Peru. It is thought to be an amphidiploid derived from *N. wigandioides* and *N. undulata*, and has a chromosome number of *n* = 24. J. G. H.

1346. Goodspeed, T. H. 633.71:576.354.4
Meiotic prophase studies in *Nicotiana*.
Genetics 1946 : **31** : p. 217. (Abst.).
Studies of meiotic prophase in species of *Nicotiana*, in an asynaptic variety and in F_1 interspecific hybrids are reported.

1347. Goodspeed, T. H. 633.71:576.354.4:575.127.2:582
Karyotypes, meiotic behavior, and systematics in *Nicotiana*.
Genetics 1946 : **31** : p. 217. (Abst.).
Various hybrids between *Nicotiana* species have been investigated cytogenetically. The generally accepted taxonomic arrangement of the genus based upon morphology and distribution was found to be in close correspondence with that based upon the cytogenetic evidence obtained.

1348. Lefèvre, J.
Ferrary, R. 633.71:576.356.5:581.04:575.127.2
Observations sur les caractères de quelques nouvelles espèces amphidiploïdes dans le genre *Nicotiana*. (**Observations on the characteristics of some new amphidiploid species in the genus *Nicotiana*).**
C.R. Acad. Agric. Fr. 1946 : **32** : 109–12.
Descriptions are given of fertile amphidiploids obtained by colchicine treatment of the following hybrids: *N. Tabacum* L. x *N. sylvestris* Speg. et Comes, *N. Tabacum* x *N. glauca* Grah. and *N. rustica* L. x *N. glauca*.

1349. 633.71:581.162.5:581.04:575.129
Bartolucci, A. 633.71:581.162.5:581.039:575.129
Poliploidia e tabacco. L'uso della colchicina e della centrifugazione dei semi, per transformare gli ibridi sterili in ibridi fertili.
(**Polyploidy and tobacco. The use of colchicine and centrifuging the seeds to transform sterile hybrids into fertile hybrids).**
Acta Nicotiana, Berlin 1939 : **1** : 240–46.
A short review is given of work on the production of fertile amphidiploids of interspecific crosses of *Nicotiana*. Colchicine is shown to be a more efficient agent than centrifuging.

1350. Frimmel, F. 633.71:581.45:575.11
Vererbung der Blattform des Tabakes. (**Inheritance of the leaf form of tobacco).**
Acta Nicotiana, Berlin 1939 : **1** : 247–50.
Brief consideration is given to the physiology of leaf development in tobacco and to the genetical factors conditioning the various component processes.

1351. Gärtner, K. 633.71:581.6(43.91)
Ueber den Nikotingehalt der ungarischen Tabake. (**The nicotine content of the Hungarian tobaccos).**
Acta Nicotiana, Berlin 1939 : **1** : 500–01.
Information is given on the nicotine content of Hungarian tobacco varieties in 1934–37.

1352. Kisfaludy, M. v. 633.71:581.6(43.91)
Die in Ungarn angebauten wichtigsten Tabakgattungen. (**The most important tobacco varieties cultivated in Hungary).**
Acta Nicotiana, Berlin 1939 : **1** : 220–27.
Descriptions are given of the Hungarian varieties Szulok, Debrecen, Szeged Rose, Theiss, Muskateller, *Nicotiana Tabacum* var. *purpurea* and *N. rustica*. Special attention is paid to quality.

1353. Christoph, M. 633.71:582
Die wichtigsten Tabaksorten. (**The most important tobacco varieties).**
Acta Nicotiana, Berlin 1939 : **1** : 141–53.
A general review is given of the botanical classification of cultivated tobacco varieties.

1354. KOSTOFF, D. 633.71–2–1.521.6:575.127.2:581.6
Some cytogenetic indices for applying interspecific hybridization in breeding desirable tobacco forms.
Acta Nicotiana, Berlin 1939 : **1** : 251–56.
Interspecific hybridization involving American and Australian species is considered with regard to its utility in improving the disease resistance and quality of cultivated varieties.

1355. WEIJ, H. G. VAN DER 633.71–2.3–1.521.6:575(92.1)
Selection of Sumatra tobacco.
Acta Nicotiana, Berlin 1939 : **1** : 257–58.
A short account is given of the history of tobacco breeding in Sumatra. It is thought that there is now little hope of further improving the old Deli strains by selection for quality and yield since these two characteristics are almost optimum. Breeding for resistance to *Bacterium solanacearum* is still in progress and giving promising results.

1356. NOLLA, J. A. B. 633.71–2.8–1.521.6:575.12(73)
Studies on disease resistance. II. Development of tobacco strains resistant to the ordinary tobacco mosaic.
Acta Nicotiana, Berlin 1939 : **1** : 408–13.
An account is given of the American breeding programme for the production of mosaic resistant tobacco varieties by utilizing the resistant properties of the Colombian variety Ambalema.

1357. MCKINNEY, H. H. and
CLAYTON, E. E. 633.71–2.8–1.521.6:581.036:575.127.2
Genotype and temperature in relation to symptoms caused in *Nicotiana* by the mosaic virus.
J. Hered. 1945 : **36** : 323–31.
Several species of *Nicotiana* carrying the necrosis factor *N* were inoculated with tobacco mosaic at different temperatures. With the possible exception of *N. repanda*, it was found that each species possess one or more factors determining mosaic susceptibility which are expressed only at temperatures above those favouring severe secondary necrosis. *N. Tabacum* x *N. glutinosa* hybrids showed a similar necrotic and mosaic reaction, according to the temperature. In crosses in which the *N* factor for *N. glutinosa* was transferred to plants bearing mosaic resistant factors derived from Ambalema and T.I. 448, secondary necrosis occurring at higher temperatures was reduced, or absent, and the mosaic was considerably reduced. The possible value of these hybrids is discussed in view of the fact that the transference of the *N* factor involves an entire chromosome (cf. *Plant Breeding Abstracts*, Vol. XIV, Abst. 598).

1358. 633.73:581.481
MENDES, A. J. T. 633.73:576.356.52
Observações citológicas em *Coffea*. VIII. Poliembrionia. (**Cytological observations in *Coffea*. VIII. Polyembryony**).
Bragantia, São Paulo 1944 : **4** : 693–708.
Both true and false polyembryony were observed in the genus *Coffea*. The species *C. arabica*, *C. canephora*, *C. excelsa*, *C. liberica* and a hybrid of *C. arabica* and *C. canephora* were all found to exhibit a small but regular percentage of diembryonic and triembryonic seeds. In the variety Bourbon of *C. arabica* a certain percentage of non-embryonic seeds was observed, whilst double embryo-sacs were also encountered.
The occurrence of haploid strains ($2n = 22$) of *C. arabica* was also noted, but no relation between the haploid state and the frequency of polyembryony could be traced. J. G. H.

1359. GELIN, O. E. V. and
SCHWANBOM, N. 633.75:575:581.48:581.162.5
Studier över vallmons odling och förädling. (**Studies on poppy cultivation and breeding**).
Agri Hortique Genetica, Landskrona 1943 : **1** : 34–56.
The history and uses of the poppy in various countries are outlined with observations on the systematic classification of *Papaver somniferum* ($2n = 22$) and *P. setigerum* ($2n = 44$) and the centre of origin of the poppy (cf. *Plant Breeding Abstracts*, Vol. IV, Abst. 1063).
In various experiments during 1940–42 at the Weibullsholm Plant Breeding Institute, so-called wild forms were used as well as the commercial varieties, Mahndorfer, Peragis, Strubes and

Eckendorfer (all from Germany) and the Hungarian varieties received under the names Alkaloida, Hatvaner and Blauer Mohn.

After an account of previous workers' findings on the relation between the size, shape and number of the lamellae and the amount of seed produced, the authors record the results of investigations of 7954 capsules of the above mentioned varieties. They found that a considerable rise in weight of seed per capsule accompanied an increase in the number of lamellae, an increase of six lamellae resulting, in one case, in ten times the amount of seed. With reference to the prevalent view that large capsules contain more seed than small ones, the writers mention that seed of *P. somniferum* f. *album* from Lithuania had exceptionally large capsules which however contained very little seed. A study of varietal differences in the number of lamellae showed that the nature of the soil also had a marked effect on the number.

Cultivation problems have also been studied and trials should be carried out of the foreign varieties at present grown in Sweden until Swedish breeders succeed in producing suitable types. The results from trials at Weibullsholm in 1940–42 are tabulated: Mahndorfer, Strubes and Eckendorfer are mentioned for their high yield and this is compared with statistical data from Swedish and German authors. Peragis possesses the specially valuable feature of closed capsules even under extreme drought conditions. Alkaloida too, under favourable conditions, proved free from shedding.

The occurrence of germination in the capsule is also referred to with relevant literature.

In considering the value and quality of the drying oil obtainable from poppies, the old-standing preference for the product from white-seeded types as compared with blue and black-seeded forms is mentioned.

1360. Rabak, F. 633.79:581.48:581.6
The effect of seeds on the quality of hops.
Wallerstein Laboratories Communications 1943 : **6** : 160–66.

The analysis of 375 samples of seedless, semi-seedless and seeded commercial hops shows that a definite relationship exists between seed content and quality as determined by the α-resin. In general, low seed content is associated with high α-resin content and high brewing value, and vice versa. The total soft resin content in each of the three classes was found to be similar in samples from four seasons. It therefore appears that seedless hops are superior to the semi-seedless and seeded types for general brewing purposes.

1361. Hill, D. D. and
Bullis, D. E. 633.79:581.6:578.08
Summary of hop grade investigations for 1941–1942.
Circ. Brew. Hop Res. Inst. 1943 : No. 6. [From Wallerstein Laboratories Communications 1944 : **7** : 47–48.].

The results of investigations carried out to determine the relationships between various physical and chemical characters are summarized.

CONDIMENTS 633.84

1362. Odland, M. L. 633.842:575(77.7)
Pennwonder.
Sth. Seedsman 1946 : **9** : No. 4 : p. 11.

The new pepper variety, Pennwonder, has been selected from a cross between California Wonder and Harris Earliest. It is an early maturing, prolific variety. The fruit are pendent and thick walled, intermediate in size between the fruit of the two parents.

OIL PLANTS 633.85

1363. Langham, D. G. 633.853.74:575.11.061.6
Plantas de ajonjolí (*Sesamum indicum* L.) que se tornan amarillas antes de la madurez. [**Plants of sesame (*S. indicum* L.) that turn orange before maturity**].
Circ. Minist. Agric. Cría, Dep. Genét. Inst. Exp. Agric. Zootec., El Valle, D.F., 1945 : No. 11 : Pp. 5.

Certain Chinese and Indian varieties fail to redden at maturity as do the majority of forms, but instead turn orange. This condition corresponds to the intermediate stage of development of the normal types; it is determined by the single recessive gene *y*.

1364. LANGHAM, D. G. 633.853.74:581.46:575.11
El modo de herencia del numéro de cápsulas por axila en el ajonjolí (*Sesamum indicum* L.). (**The mode of inheritance of the number of capsules per axil in sesame (*S. indicum* L.)**].
Circ. Minist. Agric. Cría, Dep. Genét. Inst. Exp. Agric. Zootec., El Valle, D.F., 1945 : No. 10 : Pp. 7.

The variety Selection No. 5 bears three capsules per axil, a character determined by the single recessive gene *t*. After crossing, however, this character is variously expressed, the number of capsules often varying along the fruiting axis and ranging from one to three. A similar character in Chinese and Indian varieties was shown to be determined by an allelic gene.

1365. LANGHAM, D. G. 633.853.74:581.46:575.11
Genetical studies of the sesame flower.
Science 1946 : **103** : p. 280.

A brief survey is given of the work of the Institute Experimental de Agricultura, Caracas, Venezuela, on the genetics of floral characters in *Sesamum indicum* L.

1366. LANGHAM, D. G. 633.853.74:581.46:578.088:576.16
Variations in the sesame flower.
Genetics 1946 : **31** : 221–22. (Abst.).

A study of the flowers of 44 varieties of *Sesamum indicum* L. from different countries and of the hybrids between them has revealed 33 basic morphological differences and 30 colour differences. In a genetical study of some of these characters multiple alleles and cases of linkage have been found. The marked differences in the flowers of varieties from various geographical regions suggest that the origin of sesame may be most profitably studied by investigations of the flower.

1367. LANGHAM, D. G. 633.853.74:581.47:575.242:631.554
Open sesame.
Genetics 1946 : **31** : p. 222. (Abst.).

A mutant form of *Sesamum indicum* L. with indehiscent seed pods is reported at the Agricultural Experiment Station in Venezuela. The new type behaves as a simple recessive in crosses with dehiscent sesame, and may help to solve the problem of mechanical harvesting.

1368. LANGHAM, D. G. 633.853.74:581.49:575.11
El carácter glabro en el ajonjolí (*Sesamum indicum* L.). [**The character "glabrous" in sesame (*S. indicum* L.)**].
Circ. Minist. Agric. Cría, Dep. Genét. Inst. Exp. Agric. Zootec., El Valle, D.F., 1945 : No. 8 : Pp. 5.

Individuals have been discovered within the variety Jaffa which bear glabrous leaves. This character is determined by the single recessive gene *g*.

1369. LANGHAM, D. G. 633.853.74:581.49:575.11
Ajojolí (*Sesamum indicum* L.) sin glándulas en el haz de la hoja. [**Sesame (*S. indicum* L.) without glands on the surface of the leaf**].
Circ. Minist. Agric. Cría, Dep. Genét. Inst. Exp. Agric. Zootec., El Valle, D.F., 1945 : No. 9 : Pp. 6.

The varieties Jaffa and White are devoid of glands on the dorsal surface of the leaves. When these two varieties are crossed with Criollo, Colombia or Guatemala, this character behaves as a recessive. In the F_2 generation both the parental types (eglandular and glandular respectively) were recovered, together with intermediate forms; the eglandular condition is symbolized as *s*. Most of the plants of the varieties Jaffa and White were tetracarpellary. This character was associated with *s* in hybridization, and was thus recessive to the more normal bicarpellary condition. A few plants of Jaffa however were bicarpellary, and in these cases, the tetracarpellary habit proved dominant in intravarietal crossing.

1370. LANGHAM, D. G. and RAFAEL CORTES, M. 633.853.74:581.49:575.11
Herencia del número de glándulas foliares en el ajonjolí (*Sesamum indicum* L.). [**Inheritance of the number of foliar glands in sesame (*S. indicum* L.)**].
Circ. Minist. Agric. Cría, Dep. Genét. Inst. Exp. Agric. Zootec., El Valle, D.F., 1945 : No. 7 : Pp. 6.

In the F_1 hybrid of the cross Selection No. 5 x Criollo, the number of foliar glands was found to be

intermediate between that of the parents. The frequency distribution of gland density in the F_2 generation lay along a normal curve, suggesting that this character is quantitative.

1371. LANGHAM, D. G. 633.853.74–2.19–1.521.6
Hoja fruncida, un carácter indeseable en el ajonjolí (*Sesamum indicum* L.). [**Crinkle leaf, an undesirable character in sesame (*S. indicum* L.)**].
Circ. Minist. Agric. Cría, Dep. Genét. Inst. Exp. Agric. Zootec., E. Valle, D.F., 1945 : No. 12 : Pp. 6.

Crinkle leaf is an hereditary defect caused by necrosis of the ventral parts of the veins. It is determined by the recessive gene *f*.

1372. LANGHAM, D. G. and RODRIGUEZ, M. 633.853.74–2.7–1.521.6
Resistencia al áfido (*Myzus persicae* Sulz.) en el ajonjolí (*Sesamum indicum* L.). [**Resistance to aphid (*M. persicae* Sulz.) in sesame (*S. indicum* L.)**].
Circ. Minist. Agric. Cría, Dep. Genét. Inst. Exp. Agric. Zootec., El Valle, D.F., 1945 : No. 13 : Pp. 7.

Varietal differences in the susceptibility of sesame to aphid attack are reported. The selection 43–7 proved the most resistant.

1373. 633.854.78:581.6:519.241.1
TAVČAR, A. 633.854.78:581.162.52:575.061.6
Boja perikarpa i sadržaj ulja u sjemenu sunčanice (*Helianthus annuus* L.) [**Pericarp colour and oil content in seeds of the sunflower (*H. annuus* L.)**].
Poljodjelska Znanstvena Smotra, Zagreb 1944 : No. 8 : 72–87.

Tables are given showing the correlation coefficients between pericarp colour and various other characters. The figures show that pericarp colour is not correlated with the branching habit, the shape of inflorescence, the 1000 kernel weight, the husk percentage or the oil percentage of the seeds. Lines with striped pericarp had lower proportion of sterile fruits than lines with white or uniformly coloured pericarp, the reason for which is thought to be that the striped forms are most often the products of crossing between a white and a coloured form, and are hence more heterozygous. This is thought also to account for the general impression that striped seeds have a higher oil content; their greater heterozygosity reduces the sterility and produces a higher proportion of well developed seeds.

1374. DEMIDENKO, T. T. 633.854.78–2.112–1.521.6(47)
Varieties of sunflower as characterized according to their drought resistance.
C.R. (Doklady) Acad. Sci. U.R.S.S. 1945 : **47** : 513–16.

Several sunflower varieties were tested for their reaction to soil drought in pot experiments. The experimental plants were subjected to three different treatments: (1) drought during the period of head formation, (2) drought during the periods of heading and flowering, and (3) as in treatment (2) plus drought during the period of seed ripening. Drought resistance, judged by the yield of seed in comparison with the controls, was found to vary within a given variety according to the stage of development at which wilting occurred. In general the results of field tests during one season of drought and another season of plentiful rainfall corresponded with those obtained from the pot experiments. It was also found that under wilting conditions the accumulation of reversible and irreversible hydrophilic colloids increased in drought resistant varieties, but decreased in susceptible varieties. The significance of root development in drought resistance is discussed, and certain discrepancies in the results are ascribed to the differences in root development among the varieties.

1375. FERRAND. 633.855.34:575.12
Découvertes récentes dans la génétique du palmier à huile (*Elaeis Guineensis*) et leurs conséquences quant à la sélection de ce végétal. [**Recent discoveries in the genetics of the oil palm (*E. Guineensis*) and their consequences with regard to the selection of this plant**].
C.R. Acad. Agric. Fr. 1946 : **32** : 75–79.

Of the four types of *E. guineensis* established by Rutgers, Dura and Pisifera are well-characterized genetically, while Macrocarya is a variant of Dura, and Tenera a hybrid between Dura

and Pisifera. Selection work on the oil palm is discussed, and it is suggested that, as the Tenera forms exhibit valuable economic properties, they could be improved by careful selection of Dura and Pisifera strains and subsequent hybridization.

MEDICINAL PLANTS 633.88

1376. Sievers, A. F. and Higbee, E. C. 633.88
Medicinal plants of tropical and subtropical regions.
Foreign Agric. Rep. U.S. Dep. Agric., 1942 : No. 6 : Pp. 47.
Medicinal species native or adapted to tropical and sub-tropical regions are described. . Bibliographical references are included.

1377. Cheney, R. H. 633.88(73)
Medicinal herbaceous species in the north-eastern United States.
Bull. Torrey Bot. Cl. 1946 : **73** : 61–72.
The results of a recent survey of cultivated and wild medicinal plants growing in the north-eastern United States are summarized.

1378. Martin, W. E. and Gandara, J. A. 633.885.1:581.6(8)
Alkaloid content of Ecuadoran and other American cinchona barks.
Bot. Gaz. 1945 : **107** : 184–99.
A valuable study has been made of the alkaloid content of American representatives of *Cinchona pubescens* Vahl., *C. officinalis* L. and *C. pitayensis* Wedd. Considerable variation has been encountered in each species in respect of total alkaloid content and the relative proportions of quinine, quinidine, cinchonine and cinchonidine. Triangular co-ordinate charts have been constructed to illustrate the variation in the proportions of the principal alkaloids exhibited by the chief cinchona varieties.

1379. Hodge, W. H. 633.885.1:581.6(85)
Alkaloid distribution in the bark of some Peruvian cinchonas.
Caribbean Forester, Puerto Rice 1946 : **7** : 79–86; (also in Spanish, pp. 86–97). (Mimeographed).
Information is presented on the alkaloid content of the bark of Peruvian cinchonas. This varies with the variety, the age of the tree and the position of the bark along the trunk. The principal commercial Peruvian varieties are Negra (*Cinchona Humboldtiana*), Huanuco and Monopol (*C. micrantha*), Loja and Calisaya (*C. officinalis*) and Colorada and Morada (*C. pubescens*).

RUBBER PLANTS 633.91

1380. Schultes, R. E. 633.912:582(8)
The genus *Hevea* in Colombia.
Bot. Mus. Leafl. Harv. 1945 : **12** : 1–19.
An account is given of the *Hevea* species identified by the author, including a provisional survey of their distribution.

1381. Whaley, W. G. 633.912–2.421.9–1.521.6:575
Rubber, heritage of the American tropics.
Sci. Mon. N.Y. 1946 : 21–31.
This review on rubber cultivation includes a brief account of the breeding work in progress to combat South American blight (*Dothidella Ulei*).

1382. Kramer, H. H. 633.913:575.42(73)
The evaluation of individual plant selections from a natural population of guayule, *Parthenium argentatum* Gray.
J. Amer. Soc. Agron. 1946 : **38** : 22–31.
The progenies of 42 single plant selections were compared with each other, with a mass-selected and an unselected population, and also with commercial strain 593. The following characters were studied: percentage of aberrant and off-type plants, plant height and spread, rubber and resin percentages, and time of flowering. The progenies could be grouped into two main types, a "better guayule" type and an "intermediate" type. In general the intermediate type possessed

a lower rubber percentage than the better guayule type, and was later in flowering and more vigorous. These trends in the intermediate type are attributed to the effects of interspecific hybridization with mariola during the evolution of the type. Within each main type differences in all the characters studied were found between the progenies. It is calculated that about 3% of better type plants and about 4% of intermediate plants selected would give progenies equalling or exceeding the commercial strain in vigour and rubber content. Evidence of some interaction between the characters of plant height and spread was obtained. In a highly heterogeneous population, however, it is necessary to select for both characters to improve vigour. Evidence was also obtained of association between the rubber and resin percentages. No association was found between vigour and the percentage of aberrant plants, nor between the percentages of aberrants and off-types.

1383. Rollins, C. R. 633.913:576.312.35:575.127.2
Interspecific phybridization in *Parthenium* II. Crosses involving *P. argentatum*, *P. incanum*, *P. stramonium*, *P. tomentosum* and *P. hysterophorus*.
Amer. J. Bot. 1946 : **33** : 21–30.

Vigourous hybrids were readily obtained from crosses between *Parthenium argentatum* and *P. Stramonium*; *P. argentatum* and *P. tomentosum*; *P. incanum*, *P. Stramonium*, *P. incanum* and *P. tomentosum*; and *P. Stramonium* and *P. tomentosum*. The following chromosome numbers are reported: *P. Stramonium*, $2n = 36$; *P. tomentosum*, $2n = 36$, *P. lyratum*, $2n = 68$ and *c.* 102; and *P. Hysterophorus*, $2n = 34$.

Chromosome counts of the one hybrid derived from the cross *P. argentatum* x *P. Hysterophorus* and the two hybrids obtained from the cross *P. incanum* x *P. Hysterophorus* showed that an unreduced gamete had been contributed by the female *P. argentatum* or *P. incanum* parent. *P. Hysterophorus* therefore appears to be too remote in its relationship with the other *Parthenium* species to cross readily with them.

By using *P. argentatum* plants with chromosome numbers of $2n = 36$ and $2n = 72$, a series of hybrids with $2n =$ *c.* 36, 54 and 90 was obtained from crosses with both *P. Stramonium* and *P. tomentosum*. Hybrids of all three chromosome categories were faster in growth and grew larger than comparable plants of *P. argentatum*. Plants of *P. incanum* with $2n = 54$ and 72 crossed with *P. Stramonium* gave rise to hybrids with approximate chromosome numbers of $2n = 46$–53, 54, 72 or 90. Many of these hybrids showed considerable vigour, but a number of weakly growing plants were also observed.

Hybrids with $2n = 90$ from crosses between 72-chromosome *P. argentatum* and *P. Stramonium* were considered to be the most promising for rubber production tests.

1384. Gardner, E. J. 633.913:576.356.5:581.162
Sexual plants with high chromosome number from an individual plant selection in a natural population of guayule and mariola.
Genetics 1946 : **31** : 117–24.

An individual polyploid plant of guayule, selection No. 42418, which was selected from a wild population of guayule and mariola, has been found to possess a completely sexual method of reproduction. The possible mode of inheritance of apomixis and sexuality is discussed.

1385. Gardner, E. J. 633.913:581.162.3(79.4)
Wind pollination in guayule, *Parthenium argentatum* Gray.
J. Amer. Soc. Agron. 1946 : **38** : 264–72.

A study of wind pollination in guayule, conducted at Salinas, California, is reported. Windborne pollen was found to be viable, and the results are given of pollen and seed germination tests in which pollen of different ages was used. Methods of effective isolation are discussed.

1386. Gorham, P. G. and
Landes, M. L. 633.913:581.165:578.08
Investigations on rubber-bearing plants : I. Propagation of *Taraxacum kok-saghyz* by means of leaf cuttings.
Bot. Gaz. 1945 : **107** : 260–67.

The technique is described of propagating *T. Kok-saghyz* Rod. by means of leaf cuttings. Clones differ in the readiness with which this form of reproduction may be effected.

1387. NILSSON, F. 634:575(48.5)
Växtförädlingen och fruktodlarna. (**Plant breeding and the fruit growers**).
Fruktodlaren 1946 : No. 1 : 11–15.

The development of fruit breeding in Sweden and the need for more intensive research in that sphere form the main theme of this article. Work at Alnarp and the recently acquired experimental farm at Balsgård is mentioned. Hybridization of apples, pears and plums, using, in some cases, old Swedish local varieties, especially of apples, as parents in combination with foreign and other Swedish varieties, has been carried out to obtain high quality fruit with good keeping quality, resistance to diseases and good yield. Crosses of Boiken x Cox's Orange, Boiken x Cox Pomona, Oranie x Filippa and Åkerö x Cox's Orange, have been made on a large scale at Balsgård.

Growers and nurserymen can help the breeder by co-operating in the selection of stocks and in recording the performance of different varieties and the special requirements of different strains and types.

The occurrence and value of mutations in fruit trees and the possibilities of using induced mutation and polyploidy in fruit tree breeding are briefly considered, and with special reference to work in progress with polyploid apples and pears in Sweden.

1388. 634:575(49.4)
Annales agricoles Vaudoises. 17me et 18me années. (**Agricultural annals of Vaud. 17th and 18th years**).
Lausanne 1941 : Pp. 103.

Apple

The following varieties have shown various degrees of resistance to severe cold weather: Reinette de Champagne, Reine des Reinettes (Queen of Reinettes), Reinette du Canada, Ontario, Winter Banana, Citron d'Hiver (Winter Lemon), Reinette Ananas, Transparente Blanche (White Transparent), Beauty of Bath, Raisin, Jonathan, Bismarck, and most of the late-flowering forms.

Pear

Resistance to cold is reported for the varieties Louise Bonne (Good Louise), Le Lectier, Beurré d'Hardenpont, Notaire Lepin (Notary Lepin), Beurré Clairgeau, Doyenné du Comice and Bergamote Esperen.

Plum

Early Laxton and Tuleu Gras have shown resistance to cold, and to a lesser extent also Bérouge and Fellenberg.

Cherry

The following cold-resistant varieties are mentioned: Early Rivers, Bigarreau Burlat, Bigarreau Pélissier, Bigarreau Noir Tardif (Late Black Bigarreau) and Montmorency.

1389. 634:575(49.4)
Annales agricoles Vaudoises. 19me année. (**Agricultural annals of Vaud. 19th year**).
Lausanne, 1942 : Pp. 64.

A preliminary test has been conducted of seven new Sève Villard hybrids, viz. Nos 12 286, 12 328, 12 246, 12 734, 15 174, 18 315 and 18 402. Quality tests of six Seibel strains are also recorded.

1390. MEIER, K. 634:575(49.4)
Bericht der Eidg. Versuchsanstalt für Obst-, Wein- und Gartenbau in Wädenswil für das Jahr 1943. (**Report of the Federal Research Institute for Fruit, Vine and Vegetable Culture at Wädenswil for the year 1943**).
Landw. Jb. Schweiz 1944 : **45** : 891–953.

Trials were made to test the value of various apple rootstocks and stem builders.

The pollinator Delicious is susceptible to canker.

Hybridization of vines is being carried out to obtain an early ripening, red wine variety satisfactory in quality and yield. The problem of breeding direct producers is being studied and new work is being done on the production of varieties of stocks suitable to calcareous soils and heavy soils, on which the types used hitherto have failed.

The strawberry, Wädenswil 26/2, a cross from Wädenswil I and Hansa, is now to be grown commercially; it is a vigorous grower, is very fruitful and has medium sized glossy scarlet berries of good flavour. E. W.

1391. FLORY, W. S. (jun.) 634:575(75.5)
Breeding new fruits for Virginia growers.
Proc. 50th Annu. Mtg Va St Hort. Soc. 1946 : **34** : 50–56.

Apple, peach, grape, blackberry, raspberry and blueberry breeding is in progress. The objectives of the peach breeding work include the production of (1) a peach of the Elberta type but with improved quality and greater hardiness, (2) nectarine types, and (3) adapted, early season varieties of high quality. In grape breeding the chief aim is to develop adapted varieties combining the cold and disease resistance of the native grapes with the fruit qualities of the European grape. Attempts are being made to produce an anthracnose resistant red raspberry, a cane blight resistant black raspberry, and an orange rust resistant blackberry.

1392. PASSECKER, F. 634:581.143
Jugend- und Altersformen bei den Obstgehölzen. (**Juvenile and adult forms in fruit trees**).
Gartenbauwiss. 1944 : **18** : 219–30.

A general account is presented of the morphological and physiological differences that distinguish the juvenile and adult shoots of fruit trees. In most cases, the juvenile shoots exhibit the characteristics of the ancestral wild species, these disappearing later in the adult shoots. Juvenile shoots used as cuttings root better than adult shoots, and form unions more readily in grafting. The relative durations of the juvenile and adult phases are conditioned both by genetical and environmental factors. The significance of these findings is discussed in relation to evolutionary problems and practical methods; reference is also made to the parallel investigations of Michurin and his followers.

1393. KEMMER, E. and 634.1:581.165.711
SCHULZ, F. 634.22:581.165.711
Die Bedeutung des Sämlings als Unterlage. (Baumschulstadium). [**The significance of the seedling as a stock.** (**Nursery stage**)].
Gartenbauwiss. 1944 : **18** : 59–97.

Extensive details are given of the performance of seedling stocks of apples, pears and plums. In general, diploid seedlings have proved superior to triploid.

1394. KEMMER, E. 634.11–2.111–1.521.6
Uber die Regenerationsfähigkeit der Obstgehölzwurzeln. (**The regeneration capacity of fruit tree roots**).
Gartenbauwiss. 1944 : **18** : 101–17.

Varietal differences are reported in the resistance of apple stocks to frost injury.

1395. BREMER, H. and
IŞMEN, H. 634.11–2.484–1.521.6(56)
Elma ve armutlarin en tehlikeli hastaliği olan *Fusicladium* üzerinde etütler. (**Studies on *Fusicladium*, the most dangerous disease of apples and pears**).
Ziraat Dergisi 1944 : **5** : 10–18.

There are so many local varieties of apples and pears in Turkey that a search for types resistant to *Fusicladium* should prove successful. Little research on the subject has, however,been done so far, though a certain amount of information about resistant varieties of pears is available from the Kocaeli Province. Varieties in that region found to be susceptible to *Fusicladium* are Akça (White), Istanbul Akça, Mustahey and Akşehir Akça. The varieties, Hamdüssükkâri, Samanlî and Karahüsey, are attacked in some localities, but not in others. The most resistant varieties were Uzun Kum Akçasî (Tall Sandy White) and Böresüperfen.

The number and variety of races of the fungus present a further difficulty, since varieties resistant to the local form might succumb in another locality. Research on all resistant varieties of fruit trees in all localities and practical application of the observations made is therefore highly important.

1396. DUHAN, K. 634.21:581.162.5
Untersuchungen über die Blüh- und Befruchtungsverhältnisse bei Marillen. (**Investigations on the flowering and fruiting relationships in the apricot**).
Gartenbauwiss. 1944 : **18** : 253–65.
Details are given on the flushing time, flowering duration, pollen germinability and compatibility relationships of apricot varieties. Most of the varieties studied proved to be self-fertile, the exceptions being Large Krems and Schöllschitz; Early Hungarian Yellow is only slightly self-fertile. The pollen of the self-sterile varieties germinated as readily as in the self-fertile forms.

1397. PASSECKER, F. 634.21:581.165.711
Lebensdauer und Veredlungsunterlage bei der Marille (Aprikose). (**Age and stock in the apricot**).
Gartenbauwiss. 1944 : **18** : 231–52.
It is suggested that suitable stocks should be bred for the apricot in order to prolong the life of individual trees.

1398. BURKHOLDER, C. L. 634.22(77.2)
Plum variety trials at the Purdue Farm Bedford, Indiana.
Bull. Ind. Agric. Exp. Sta. 1941 : No. 458 : Pp. 20.
Native plum varieties, Japanese plums, European x Japanese hybrids and European varieties are discussed with reference to tree vigour, first fruit setting, resistance to injury by spring frost, and yield.

1399. 634.23:575(71.27)
LESLIE, W. R. 635.64:575(71.27)
Manitoba news latter.
N. and S. Dak. Hort. 1946 : **19** : p. 37.
Descriptions are given of the Morden tomato and Manor cherry plum, recently named at the Morden Experimental Station, Manitoba.
The Morden golden tomato arose as a mutation among Bristol x Round Smooth hybrids. The variety is six days earlier than Mingold, and a deeper golden colour. The plant tends to be determinate in habit, growing 12 inches in height. The fruits have an attractive sub-acid flavour.
The Manor cherry plum is an open-pollinated seedling of Sapa. It is considered to be valuable as an early variety for Minnesota, North Dakota and the three Prairie Provinces; it is suitable for canning, and jam and juice making. The new cherry-plum is hardier than Sapa.

1400. VERNER, L. 634.23–2–1.521.6:575(79.6)
The Lamida, Ebony and Spalding sweet cherries.
Circ. Idaho Agric. Exp. Sta. 1946 : No. 109 : Pp. 4.
The sweet cherry varieties, Lamida, Ebony and Spalding, have been developed at the Idaho Agricultural Experiment Station in a programme of breeding for resistance to fruit-cracking, in which the susceptible varieties Bing, Lambert and Napoleon (Royal Ann) have been used as the female parents, and the resistant varieties Deacon, Black Republican and Black Tartarian, as the pollen parents. The majority of seedlings so far obtained are from open-pollinated trees. The resistance of Lamida, a Lambert seedling, equals that of Deacon; this cherry appears promising as a variety to replace Lambert. Ebony and Spalding, derived from the crosses Lambert x (?) Black Republican and Bing x (?) Deacon, respectively, are only slightly more resistant to cracking than their female parents, but they possess desirable characters which might make them useful varieties in districts where cracking is not a serious problem.

1401. BACCHI, O. 634.31:576.356.5:581.04
Observações citológicas em *Citrus*. VI. Resultados preliminares do efeitoda colchicina sôbre sementes em germinação. (**Cytological observations in *Citrus*. VI. Preliminary results on the effect of colchicine on germinating seeds**).
Bragantia, São Paulo 1944 : **4** : 679–91.
The germinating seeds of two varieties of *Citrus sinensis*, Pêra do Rio and Barão, and one of *C. reticulata*, Mexirica do Rio, were subjected to varying strengths of colchicine solution in an effort to produce tetraploids.

In three cases plants were observed with diploid and tetraploid roots and tetraploid epidermis, whilst one other plant with a hyperdiploid ($2n = 19–20$) epidermis was found to possess one root of a chimaeral nature with both diploid and tetraploid cells. J. G. H.

1402. BARRETT, M. F. 634.37:582
Ficus tsjahela.
Bull. Torrey Bot. Cl. **1946** : **73** : 86–90.
The author clarifies the position of the species *Ficus Tsjahela* Burm. f., differentiating it from the type of *F. lacor* Ham. and from *F. geniculata* Kurz, and discussing synonyms.

1403. DUGAND, A. 634.37:582(86)
Nuevas especies de *Ficus* de Colombia y del Ecuador. (**New species of *Ficus* from Colombia and Ecuador**).
Caldasia, Bogota **1943** : No. **6** : 77–80.
Six new fig species are described by the author: *F. metensis, F. orocuensis, F. Schultesii, F. Vallis-Caucae, F. guayaquilensis* and *F. Ynesina.* The first four species are Colombian and the latter two Ecuadorian.

1404. DUGAND, A. 634.37:582(86)
Nuevas nociones sobre el género *Ficus* en Colombia. (**New ideas on the genus *Ficus* in Colombia**).
Caldasia, Bogota **1943**: No. **8** : 265–83.
This paper includes descriptions of three new Colombian species: *F. Ciroana, F. fresnoensis* and *F. ocoana.*

1405. DUGAND, A. 634.37:582(86)
Nuevas nociones sobre el género *Ficus* en Colombia, II. (**New ideas on the genus *Ficus* in Colombia, II**).
Caldasia, Bogota **1944** : No. **9** : 375–86.
This taxonomic article includes descriptions of three new Colombian species: *F. chiribiquetensis, F. palmirana* and *F. Vicencionis.*

1406. DUGAND, A. 634.37:582(86)
Nuevas nociones sobre el género *Ficus* en Colombia, III. (**New ideas on the genus *Ficus* in Colombia, III**).
Caldasia, Bogota **1944** : No. **10** : 439–42.
This article includes a description of the new fig species *F. ajajuensis.*

1407. CRUESS, W. V.,
HOHL, L. A.,
JIMÉNEZ, M. A.,
NICHOLS-ROY, S. and
TORRES Y ZORRILLA, R. 634.42:577.16:581.6(72.91)
Estudios de laboratorio sobre guayaba. (**Laboratory studies on the guava**).
Alm. Minist. Agric. Argentina **1946** : **2** : 81–86.
Varietal differences in the vitamin C and total acid content of Cuban guavas are reported.

1408. SLATE, G. L. 634.54(74.7)
Filberts.
Circ. N.Y. St. Agric. Exp. Sta. **1941** : No. **192** : Pp. **14.**
Descriptive notes are included on varieties of the European filbert (*Corylus Avellana*), the Rush and Winkler varieties of *C. americana*, and hybrids between Rush and certain European filberts.

1409. BATTEN, E. T. 634.58:575.42(73)
High-yielding Hollands enter the peanut picture.
Sth. Seedsman **1946** : **9** : No. **1** : p. **13.**
An account is given of the new strains, Holland Virginia Runner and Holland Jumbo (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 926).

1410. DUGAND, A. 634.6:582(86)
Una palma nueva del género *Desmoncus*. (**A new palm of the genus *Desmoncus***).
Caldasia, Bogota 1943 : No. 6 : 75–76.
A new Colombian palm species, *D. myriacanthos* Dugand, is described. It is related to *D. horridus* Splitg. ex Mart. and is referred to locally as matamba.

1411. DUGAND, A. 634.6:582(86)
Noticias bótanicas colombianas, II: Especies nuevas y críticas. (**Colombian botanical notes, II: New and critical species**).
Caldasia, Bogota 1943 : No. 8 : 285–99.
This article includes a description of the new palm species *Orbignya Cuatrecasana*.

1412. DUGAND, A. 634.6:582(86)
Palmas nuevas o críticas colombianas. (**New or critical Colombian palms**).
Caldasia, Bogota 1944 : No. 9 : 387–95.
Descriptions are included of three new palm species: *Mauritiella pacifica, Lepidocaryum Allenii* and *Catostigma inconstans*.

1413. DUGAND, A. 634.6:582(86)
Palmas nuevas o críticas colombianas, II. (**New or critical Colombian palms, II**).
Caldasia, Bogota 1944 : No. 10 : 443–58.
A description is included of the new species *Aiphanes echinocarpa*.

1414. ADSUAR, J. 634.651–2.8
Transmission of papaya bunchy top by a leaf hopper of the genus *Empoasca*.
Science 1946 : **103** : p. 316.
The vector of the virus disease bunchy top, which affects papaya, has been found to be a species of *Empoasca*, probably *E. papayae*.

1415. KANÉR, R. 634.71:582(48.5)
Rubusstudier i nordvästra Skåne. (***Rubus* studies in north-western Scania**).
Bot. Notiser 1941 : 367–74.
Critical notes are presented on the taxonomy of Scanian *Rubi*.

1416. GUSTAFSSON, A. and
HÅKANSSON, A. 634.74:576.356.5
Meiosis in some *Rosa*-hybrids.
Bot. Notiser 1942 : 331–43.
Hybridization experiments have gone far to show that at least three homologous chromosome sets are present in each of the three species *R. canina, R. rubiginosa* and *R. rugosa*. This internal triploidy is regarded as a potent cause of the variation of the *Caninae* roses.

1417. FAES, H. 634.835:575.12(49.4)
Rapports annuels 1943 et 1944. Station fédérale d'essais viticoles et arboricoles à Lausanne et Domaine de Pully. (**Annual reports for 1943 and 1944 of the Federal Experimental Station for Viticulture and Arboriculture at Lausanne and Domaine de Pully**).
Landw. Jb. Schweiz 1945 : **46** : 671–707.
Direct producers, owing to the greater thickness and elasticity of their leaves, were found to be better able to resist hail than Chasselas vines.
In 1943 thirteen pedigree selections of the station were planted, and also a line of Chasselas Doré de Fontainbleau; a hybrid direct producer, White Excelsoir was included for study. Six red European vines, all grafted on 3309, are being multiplied for comparison of their wines. Two new hybrids for study are Seibel 14–514 and Seyve-Villard 14–665.
Numerous crosses were effected between different varieties of peas, of apple and of apricot to obtain interesting new varieties.

1418. 634.835:581.6(49.4)
Annales agricoles Vaudoises. 21me année. **(Agricultural annals of Vaud. 21st year).**
Lausanne, 1943 : Pp. 66.
Quality tests of Seibel and Sève Villard vine varieties are reported.

1419. Fennell, J. L. 634.835:581.6:575.127.2(72.86)
The tropical grape.
Sci. Mon. N.Y. 1945 : 465–68.
An account is given of the work now being done at Costa Rica on breeding grape varieties adapted to tropical climates. The initial material comprises such wild species as *Vitis Shuttleworthii*, *V. rufotomentosa*, *V. Smalliana*, *V. gigas* and also naturally occurring hybrids of these species. These forms have been hybridized with each other and also with temperate commercial varieties.
Descriptions are given of the following new varieties. Fairchild, from the wild agras vine x Alphonse Lavellee, is a sweet fruited variety with medium sized berries; it is immune to rust. Tropico, from Calloosa No. 5 (*V. Shuttleworthii*) x a complex hybrid of *V. Champini*, *V. Labrusca* and *V. vinifera*, is a tropical form with large purplish black berries exceeding Concord in quality. Marco, from *V. rufotomentosa* No. 9 x (Calloosa x Niagara), resembles Delaware in flavour but has smaller fruits. Wachula, of the same parentage as the preceding variety produces sweet medium sized grapes with a mild vinous flavour. Biscayne, from *V. rufotomentosa* No. 9 x a European variety, bears dark-red translucent berries with a *vinifera* flavour.

FORESTRY 634.9

1420. Tucker, J. M. and
Muller, C. H. 634.972.1:582(72)
Additions to the oak flora of El Salvador.
Madroño 1945 : **8** : 111–17.
This article includes a description of *Quercus esesmilensis*, a new oak species from the cloud forest of El Salvador.

1421. Gertz, O. 634.972.5:582(48.5)
***Fagus silvatica* L. f. *osbyensis*.**
Bot. Notiser 1942 : 75–83.
F. sylvatica f. *osbyensis* is a newly described form of beech differing from the type in its aberrant leaf structure. Only a single bush has been discovered, and that at Osby in Scania.

1422. Johnsson, H. 634.972.6:576.356.5:575.127.2
Triploidy in *Betula alba* L.
Bot. Notiser 1944 : 85–96.
Triploids within *B. alba* sensu lato may either represent F_1 hybrids of *B. verrucosa* x *B. pubescens* or may be autotriploids of *B. verrucosa*. The autotriploid appears to form 28-chromosome gametes frequently, and it is possible that these, hybridizing with *B. pubescens*, give rise to many of the intermediate morphological forms known to exist between Ehrhart's two species.

1423. Tucker, C. M. 634.972.8–2.8–1.521.6
Phloem necrosis, a destructive disease of the American elm.
Circ. Mo. Agric. Exp. Sta. 1945 : No. 305 : Pp. 15.
An account is given of the elm virus disease, phloem necrosis. The American elm (*Ulmus americana*) is susceptible to the disease. The other native species, *U. Thomasi* and *U. fulva* are resistant; no definite data are available on the reaction of *U. alata*. The introduced species, *U. campestris* and *U. pumila*, are also resistant. It is considered that the development of resistant varieties of the American elm is a possible method of control.

1424. Stockwell, P. and
Righter, F. I. 634.975
***Pinus*: the fertile species hybrid between knobcone and Monterey pines.**
Madroño 1946 : **8** : 157–60.
The fertile interspecific F_1 and F_2 hybrids of *Pinus attenuata* Lemmon x *P. radiata* Don are described. It is pointed out that the existence of these hybrids challenges the specific status of the parental forms.

1425. Løfting, E. C. L. 634.975:575(48.9)
VIII. Lærkearternes Udvikling i Hedeplantagerne og Japansk Laerks Anvendelighed som Hjælpettræ ved Opbygning af Hedeskov. (**VIII. The development of the larch species in heath plantations and the use of the Japanese larch as an adjunct in forming a heathland wood**).
Det forstlige Forsøgsvæsen i Danmark **1945** : **16** : 323-64. [**Beretning No. 147**].

A study of the performance of the Asiatic species of larch used in laying down plantations on heathlands in Denmark has shown that *Larix sibirica* and *L. Gmelini* var. *olgensis* are unsuitable while *L. Gmelini* var. *japonica*, though it develops excellently, appears to thrive only under favourable conditions and does not seem to be able alone to cover the floor; it is inferior to the Japanese larch (*L. leptolepis*), excepting possibly in its fine branched form. *Larix Gmelini* (*Larix dahurica*) appears not to differ essentially from *L. Gmelini* var. *japonica* used in the Mangehoje plantation. *Larix leptolepis* (*L. Kaempferi*), which proved very hardy and vigorous, covers the floor well and thrives even when pruning is defective or omitted; this species well merits consideration for heathland plantations.

The paper also sets out the characteristics of the *Larix leptolepis* and its performance in various situations, and, in conclusion, it is recommended as of great value as an ingredient in mixed plantations. It is unsuited to localities subject to drought. Otherwise, only its tendency to become coarse branched and to encroach on its neighbours reduces its value somewhat. Various hybrids will probably be of great value, e.g. firstly the F_1 from crosses between the Sudeten or Scottish European larch and *L. leptolepis*, and secondly, the F_1 of *L. Gmelini* var. *japonica* x *L. leptolepis*. For heathland plantations economic questions concerning seed production etc. are also mentioned. *L. leptolepis*, in a suitable climate, is very resistant to larch canker (*Dasyscypha Willkommii*) and frost, but in Northern and Central Sweden its frost resistance is less reliable, and, as in Germany, it is severely attacked by canker.

VEGETABLES 635

1426. Timofeev, N. N. 635:575"793":575.11.061(47)
(**The inheritance of characters in vegetables and its relationship to the length of the vegetative period**).
Moskovskaja ordena Lenina Seljskohozjaĭstvennaja Akademija imeni K.A. Timirjazeva, Naučnaja Konferencija 6–13 Dekabryja 1944 g. II. (Timirjazeva Agric. Acad. Moscow Rep. Sci. Conf. 6–13 December) 1944 (1945) : No. 2 : 90–93.

When Rudzinskiĭ Štambovoĭ, a late pea variety with fasciated stems, was crossed with either Svalöf or Žegalov, both late unfasciated pea varieties, unfasciated and fasciated plants occurred in the F_2 in the Mendelian ratio of 3 : 1. As many as 32% of the fasciated progeny had stems which were very fasciated, and only 18% had stems slightly fasciated. Whereas only 2% of the F_2 plants of the above crosses bore the character of earliness, crossings between Rudzinskiĭ Štambovoĭ and the early varieties with unfasciated stems, Alaska and Tulun, resulted in 21% early plants in the F_2 generation. Moreover, 82% of all the progeny had unfasciated stems and 17% fasciated; of the latter only 12% were very fasciated but as many as 40%, very slightly fasciated. This deviation, 5:1, from the expected Mendelian ratio is attributed to early habit. Earliness is said to weaken or even to suppress the expression of fasciation, and in many of the apparently unfasciated plants the fasciated character was found to be latent in the homozygous condition.

In certain crosses of tomato varieties, the F_2 ratio of plants bearing multilocular fruit to those with few locules was found to be 1 : 2 or 1 : 2·3 instead of 1 : 3. Such a result is attributed to the presence among the plants with multilocular fruit of a proportion of early plants, a characteristic of which is the production of multilocular fruit. No connexion was established between the duration of the vegetative period and locule number, and the production of multilocular fruit by early plants is described as the result of a peculiar development of the inflorescence, not as a genetical phenomenon.

When an early red radish was crossed with an early white radish, the F_2 ratio of coloured to white roots was 3 : 1. White roots were early, intermediate or late; but red roots were found to be correlated with earliness, because the pH value of the cell sap in the early plants favoured the red colour, while violet roots were found to be correlated with a late or intermediate period of maturity.

Some characters, such as flesh colour in the tomato, swede and turnip, and the colour of pea seeds, show no deviation from the expected Mendelian ratio, while others such as crinkling in lettuces or cabbages, deviate only slightly when the character of earliness is transmitted to the F_2 generation.

1427. BEEKOM, C. W. C. VAN and VEENSTRA, G. 635.25:575(49.2) 635.25.00.14(49.2)
Uienproefvelden en proefnemingen met uien 1939. (**Onion experimental plots and trials with onions 1939**).
Ned. Uien-Federatie, Wageningen, Holland 1939 : Pp. 51.

BEEKOM, C. W. C. VAN
Verslag der proefvelden en proefnemingen met uien en sjalotten over 1940. (**Report on the experimental fields and trials with onions and shallots during 1940**).
Meded. LandbvoorlichtDienst, Wageningen, Holland 1941 : No. 15 : Pp. 92.

The first report is of the Dutch Onion Federation (Nederlandsche Uien-Federatie), a voluntary organization which collaborates with the Dutch Board of Agriculture (Directie van den Landbouw) in specialized research on onions.
Descriptions are given of the selections, including foreign strains tested in various localities; the methods and criteria used in judging; the results; and data on manuring trials, disease control and cultivation, including spacing trials.
The variety Perijka and the selections P. Voogd and P. Mijs are recommended for export to distant countries or for prolonged storage owing to their keeping properties, while Favoriet, and the selections Joh. van Nieuwenhuizen, M. van Nieuwenhuizen and M. van Zielst are of the Rijnsburger type and suitable for export to England. The late ripening, high yielding white onion Bola keeps well and merits special interest.
Valuable types should be more strongly recommended so that, in large scale growing, they may replace the local varieties. The Wageningen Institute of Plant Breeding (Instituut voor Planteveredeling) is assisting in this aim by including in their variety list of crop plants the information provided by the Dutch Onion Federation.
Some trials were also made with the mild flavoured varieties Sweet Spanish, Torrentimo and Valenciana, the last two from the Argentine. This type of onion should be developed for commercial purposes with special attention to attractive shape and the elimination of stalk development, poor keeping quality and the tendency to flower.
The second report follows the same lines as the first but is fuller and gives information on shallots also.
The list of the best selections is amplified by (1) information drawn from the seventeenth descriptive crop variety list issued by the Wageningen Institute of Plant Breeding and (2) particulars relating to the available assortment of Dutch strains of onions and to trials with foreign strains.
The important question of early maturity is being studied from the agronomic side, and a special summary by A. H. Blaauw is included on flower-stalk formation in onions for planting and on storage temperature.

1428. LEVINE, M. 635.25:576.353:581.04:537.531
The effect of colchicine and acenaphthene in combination with X-rays on plant tissue—II.
Bull. Torrey Bot. Cl. 1946 : **73** : 34–59.

A report is given of experiments carried out to study the effect of different treatments of colchicine or acenaphthene followed by various X-ray doses upon the external appearance and cytology of root-tips of *Allium Cepa* bulbs.

1429. 635.25.00.14(49.2)
BEEKOM, C. W. C. VAN. 635.26.00.14(49.2)
De resultaten van drie jaren onderzoek van ui en sjalot. (**The results of three years' study on onions and shallots**).
Meded. LandbvoorlichtDienst, Wageningen 1942 : No. 27 : Pp. 76.

This further report (cf. Abst. 1427 above) on onion improvement in Holland contains the results of trials with strains of Dutch onions which were being tested for earliness, shape, yield and storing properties, hardness, and the undesirable features, thickneck and red colour. Keys are

provided for the numerical classification of the performance of the various strains included in the tables of results, with descriptions of the four main types, the Rijnsburger, Zeeuwsche Bruine (Zeeuw Brown), Noord-Hollandsche Stroogele (North Dutch Straw Yellow) and the Friesche Gele (Frisian Yellow).
The techinque of storage is discussed with special reference to frost. Instructions on how to produce a very early crop are also given, Primeur, Galathee and Zittaner Risen (Zittan Giant) being specially recommended as suitable for the purpose.
One section of the report is devoted to the qualities of the Zwijndrechtsche seedling onion, as shown in trials and observations on winter hardiness; the best strain was a selection sent in by N. V. Gebr. van Namen of Dordrecht, which is specially mentioned for winter hardiness and colour, and has been included in the Variety List of the Institute of Plant Breeding, Wageningen. Preliminary trials of the Ouddorpsche brown shallots have been begun.

1430. Myers, C. H. and
Fisher, W. I. 635.34:575:631.531.12(74.7)
Experimental methods in cabbage breeding and seed production.
Mem. Cornell Agric. Exp. Sta. 1944 : No. 259 : Pp. 29.
An account is given of cabbage breeding and seed production at the Cornell University Agricultural Experimental Station. Line breeding, F_1 hybrid vigour, and hybrid progeny selection are discussed. Breeding objectives are described under the following headings: increase in uniformity, quality, size and shape of the head, disease resistance, regional adaptation, and productivity. Breeding for resistance to yellows has been included in the breeding programme since 1936. Various technical aspects are considered, such as storage of the heads, propagation of the plants in the greenhouse, pollination and bud-pollination. Information on crossing in the cabbage tribe is summarized, and discussed in relation to the maintenance of varietal purity.

1431. Reinhold, J. 635.41:581.143.26.035.1
Der Einfluss der Tageslänge und der Lichtintensität auf das Wachstum der Reichsspinatsorten. (**The influence of day length and light intensity on the growth of German spinach varieties**).
Gartenbauwiss. 1944 : **18** : 266–87.
Varietal differences in the reaction of spinach to various photoperiodic treatment are described.

1432. Whitaker, T. W. and
Davis, G. N. 635.611–2.421.1–1.521.6:575(79.4)
Cantaloupes 6 and 7.
Sth. Seedsman 1946 : **9** : No. 2 : 14, 54.
Descriptions are given of the new cantaloupe strains resistant to powdery mildew, Powdery Mildew Resistant Cantaloupe No. 6 and No. 7, developed from back-crosses of hybrids between resistant Indian types and the commercial type No. 45. The fruits of No. 6 are characterized by a small button-like protrusion at the blossom end; they are roundish, well-netted, with firm flesh, a small seed cavity and fairly high sugar content. The fruits of No. 7 tend to be flattish. The flesh is firm and the seed cavity small; the fruit contain an average sugar content. No. 6 has given good results in the Imperial Valley, California. No. 7 has, however, been less successful on account of its late maturity, and the shape and small size of its fruit.

1433. Hartman, J. D. and
Gaylord, F. C. 635.611–2.484–1.521.6:575(77.2)
The Purdue 44 muskmelon.
Circ. Ind. Agric. Exp. Sta. 1944 : No. 295 : Pp. 8.
Purdue 44 is a new early-maturing muskmelon variety resembling the Hale's Best type in plant and fruit characteristics. It has been selected from the variety New Seed Breeders. The variety is resistant to *Alternaria cucumerina*, but susceptible to bacterial wilt. In edible quality the fruit equals other varieties of the Hale's Best type. Under conditions of severe *Alternaria* infection, Purdue 44 has given a higher sugar content than New Seed Breeders. The new variety has shown good adaptation to the sandy soils of south-western Indiana.

1434. Poole, C. F. and
Grimball, P. C. 635.615:577.8:575.116.1:581.47:575–18
Interaction of sex, shape, and weight genes in watermelon.
J. Agric. Res. 1945 : **71** : 533–52.

The interaction of genes determining sex habit and fruit shape and weight has been investigated in crosses between round, light in weight, andromonoecious varieties of water-melon and long heavy monoecious varieties, viz. Northern Sweet and Dore, Baby Delight and Dore, Baby Delight and Peerless, and Winter Queen and Sun, Moon and Stars. The character of fruit shape, determined by the gene pair *Oo*, was found to be linked with the character of sex habit, determined by the gene pair *Aa*, long fruit shape (*O*) being associated with monoecious sex habit (*A*) and vice versa. In three of the crosses, fruit shape, but not sex habit, appeared to be correlated with fruit weight, long fruits tending to be heavier than round. In the back-cross of (Peerless x Baby Delight) x Baby Delight) however, monoecious fruits were significantly heavier than andromonoecious fruits, but the differences between long and round fruits were not significant. The number of genes segregating for weight inheritance was calculated in the cross Northern Sweet x Dore. It was estimated as 25 genes in the F_2 and as 12 genes in the back-cross to Northern Sweet.

1435. 635.615–1.525(47)
(Letter from a reader).
Sovhoznoe Proizvodstvo (State Farming) 1945 : No. 3 : p. 49.

The correspondent describes the process of acclimatization of the fodder water-melon to conditions in the province of Omsk. The seed was obtained from the Azov Black Sea Agricultural Institute.

1436. Scott, D. H. and
Riner, M. E. 635.62:581.45:575.11.061.633
A mottled-leaf character in winter squash inherited as a dominant Mendelian character.
J. Hered. 1946 : **37** : 27–28.

A mottled leaf character occurring in the variety Zuni (*Cucurbita maxima*) is described, which behaves as a single dominant to the character of uniform green leaf colour. The character may be valuable as a marker in linkage investigations.

1437. Buchinger, A. 635.62:582
Die wichtigsten europäischen Kürbisarten. (**The most important European gourd species**).
Gartenbauwiss. 1944 : **18** : 311–32.

An account is given of the variation in morphological and developmental characters exhibited by European representatives of *Cucurbita Pepo, C. maxima, C. moschata* and *C. ficifolia.*

1438. Whitaker, T. W. and 635.62:582
Carter, G. F. 635.62:581.9:576.16(73)
Critical notes on the origin and domestication of the cultivated species of Cucurbita.
Amer. J. Bot. 1946 : **33** : 10–15.

A discussion is given of the essential differences between the three species, *Cucurbita Pepo, C. moschata* and *C. maxima*, and practical criteria for their identification are suggested. The hypothesis is put forward that two independent domestications of *C. Pepo* have taken place, in the eastern United States and the Gila-Colorado or north-western Mexican region respectively, giving rise to distinct varietal types (cf. *Plant Breeding Abstracts*, Vol. XV, p. 375). A south-western domesticated form of *C. Pepo*, cultivated by the peoples of the Gila-Colorado area from Pueblo II times, is described for the first time, and is shown to be quite distinct from the eastern domesticated types of *C. Pepo*. It is pointed out that the deviations of the south-western types from their eastern counterparts are mostly in the direction of *C. moschata* characters, suggesting contamination by *C. moschata* of the south-western *C. Pepo* during the course of its development. The origin of *C. Pepo* and the relationships of the domesticated cucurbits are discussed. A diagram illustrating the possible relationships of the three species is included.

1439. Fennell, J. L. 635.64:575.12(81)
A new tomato for the tropics.
Agric. Amer. 1945 : **5** : 233–34.

The new variety, Turrialba, is an F_3 hybrid of a cross between Marglobe and a form of *L. esculentum* var. *cerasiforme* with a compound ovary. It is suitable for cultivation in the lowland tropics. The hybrid is vigorous and high yielding, producing firm fruit with a diameter of 3 to $3\frac{1}{2}$ inches. It shows better resistance to disease than many commercial varieties, including resistance to *Alternaria Solani*. The need for greater homozygosity is stressed.

1440. Lesley, M. and
Lesley, J. W. 635.64:581.47:575.127.2:575.11.061.6
A genetic study of flesh color of fruit in hybrids of *Lycopersicon esculentum* Mill. and *L. hirsutum* Humb. and Bonpl.
Genetics 1946 : **31** : 222–23. (Abst.).

Red fleshed *RR* or *Rr* plants of *L. esculentum* were crossed with *L. hirsutum* having yellow green fruits; F_1 plants were back-crossed to *RR* plants of *L. esculentum*. Very little red colour was present in the F_1 fruit. In the first and second back-cross generations and derived families, at least six types of flesh colour occurred which were not present in either parent species. In general, types deficient in red colour were found to be dominant. A type termed orange, with pink flesh, is probably a simple dominant to the red colour of *L. esculentum*. The species differ in at least three genes whose dominant alleles inhibit formation of pigments, especially lycopene.

1441. Porte, W. S. and
Walker, H. B. 635.64–2–1.521.6:575.127.2
A cross between *Lycopersicon esculentum* and disease-resistant *L. peruvianum*.
Phytopathology 1945 : **35** : 931–33.

A successful cross between *L. esculentum* and the disease resistant species *L. peruvianum* is reported. The variety of *L. peruvianum* used as pollen parent was Prince Borghese. A small F_2 population has been grown in the field from open-pollinated F_1 plants. The progenies of crosses between the interspecific hybrids and variety and hybrids of *L. esculentum* show wide segregations in plant habit, fruit and foliage characters, and fruitfulness.

1442. Weaver, J. G. 635.64–2.3–1.521.6:575.127.2(75.6)
Seeking a tomato resistant to bacterial wilt.
Res. and Fmg, N.C. 1944 : **3** : Progr. Rep. No. 1 : p. 11.

Breeding bacterial wilt resistant tomatoes by crossing wild tomato strains and commercial varieties is in progress at the North Carolina Agricultural Experiment Station. The crosses between Louisiana Pink and T414 and between T414 and Devon Surprise appear to be promising.

1443. Barratt, R. W. and
Richards, M. C. 635.64–2.484–1.521.6:575(74.2)
***Alternaria* blight versus the genus *Lycopersicon*.**
Tech. Bull. N.H. Agric. Exp. Sta. 1944 : No. 82 : Pp. 24.

Literature on the reaction of tomato varieties and lines to *Alternaria Solani* Ell. and Mart. is reviewed. None of the lines tested by the authors were found to be immune or resistant to the disease. Difference in the amount of defoliation under field conditions were, however, observed. The various factors influencing defoliation, such as period of yield, are examined. The following suggestions are made: (1) the collection and testing of introductions for immunity or resistance to *Alternaria* blight should be continued; (2) the crossing of *Lycopersicon* species with closely related Solanaceae, by means of the embryo isolation technique, offers a possibility of securing the desired reaction; and (3) the breeding of strongly vegetative varieties may provide a measure of control, since it has been found that the smaller the amount of fruit per leaf the smaller the amount and rate of defoliation.

1444. Montelaro, J. 635.648:581.49:575(76.3)
Easy-pickin's : new spineless okra.
Sth. Seedsman 1946 : **9** : No. 1 : p. 15.

A new variety of okra, Louisiana Spineless Green Velvet, has been produced. The pods are quite free from spines, 6–7 inches long, and green and smooth. The variety has good cooking qualities and is specially suitable for canning.

1445. Isbell, C. L. 635.652:575(76.1)

Alabama's new bean: Mild, White and Giant.

Sth. Seedsman 1946 : **9** : No. 1 : 11, 38.

The new variety of pole snap bean, Mild White Giant, is described. It is a white seeded variety, giving high yields of beans suitable for eating as pods or dry beans. It produces a heavy vine growth, and may yield a second crop.

1446. Lamprecht, H. 635.652:575.11.061.6:581.13

Om sambandet mellan fröproduktion och baljfärg hos trädgårdsbönor, särskilt med hänsyn till effekten av klorofyll och xantofyll. (**On the relation between seed production and pod colour in garden beans, especially with reference to the effect of chlorophyll and xanthophyll**).

Agri Hortique Genetica, Landskrona 1944 : **2** : 1–19.

The correlation between the pod colours, green, greenish grey, yellow and white, and seed yield has been studied in six crosses of *Phaseolus vulgaris*, comprising 4916 plants. The four colours in question are respectively conditioned by the factors *Y Arg* (presence of chlorophyll and xanthophyll); *y Arg* (absence of chlorophyll); *Y arg* (absence of xanthophyll) and *y arg* (absence of both pigments). The crosses were made according to the scheme *Y arg* x *y Arg* and in such a way as to exclude all possible sources of error such as linkage and resistance to disease.

The results showed that, when the pods lacked chlorophyll or xanthophyll, the yield fell in either case by about the same amount, the loss showing a range of between 11 and 30%, according to the ratio between the pod surface and the total assimilative surface of the plant. Recessivity of the chlorophyll or xanthophyll genes, or of both, also contributed to the fall in yield, owing to their effects upon the colour and consequently upon the assimilative function of the nerves, stems and nodes and thus ultimately upon assimilation in the leaves.

A study was also made of the effect of absence of chlorophyll or xanthophyll in hybrid populations comprising four types of plants as regards pod colour, namely plants containing: (1) chlorophyll + xanthophyll = green (*Y Arg*); (2) chlorophyll = greenish grey (*Y arg*); (3) xanthophyll = yellow (*y Arg*); and (4) lacking both pigments (*y arg*). The results indicated *inter alia* that both pigments function equivalently in photosynthesis since the absence of one or other causes the same decrease in yield. That the lines or hybrid population show different decreases in yield is mainly owing to the considerable range of variation that prevails in the relation between the assimilative surface of the pods and the entire plant.

Finally, evidence from two crosses is interpreted as suggesting that the intermediate products of assimilation can migrate from the green vegetative parts of the plant into pods, where, in the presence of chlorophyll or xanthophyll, they can be utilized for tissue production.

1447. Lamprecht, H. 635.652:575.127.2:575.11
575.17:576.311:576.16

En ny prydnadsväxt ur korsningen mellan trädgårdsoch blomsterböna, jämte ett klarläggande av artbegreppet. (**A new ornamental plant from a cross between the garden bean and the scarlet runner, with an elucidation of the species concept**).

Agri Hortique Genetica, Landskrona 1945 : **3** : 14–32.

The main characteristics of *Phaseolus vulgaris* L. and *Ph. coccineus* L. are described to show how, starting from a combination of various characters, already known to be genetically determined, a plant of ornamental type can be obtained.

Lamprecht's previous work (cf. *Plant Breeding Abstracts* Vol. XI, Abst. 1139 and Abst. 1160 above) has provided data showing that all the genes in the cross *Ph. vulgaris* x *Ph. coccineus*, with the exception of the gene for hypogeal cotyledons and the gene for stigma form, can be combined in progeny of normal fertility. Epigeal cotyledons in *Ph. vulgaris* and hypogeal cotyledons in *Ph. coccineus* are conditioned by two allelogenes. One allele (*Epi*) is specific to *Ph. vulgaris* and the other (*Hyp*) to *Ph. coccineus*. The genes for stigma form, *Int* and *Ext*, are also allelomorphic, *Int* being specific to *Ph. vulgaris* and *Ext* to *Ph. coccineus*.

A study of the genetic basis of the interspecific sterility barrier, constituted in part by the above two pairs of allelomorphic genes, indicated that these genes do not reproduce *per se* but require a special substance, a progene, for their reproduction. The progenes may fail to reproduce when introduced into the plasma of a foreign species. Hence in the interspecific hybrid of *Ph. coccineus* and *Ph. vulgaris*, the two allelomorphs of the male parent very frequently fail to reproduce

and cells lacking one or other of these genes degenerate. In the very rare instances in which the foreign allelomorphs do reproduce, the resulting progeny are either completely or highly sterile and their progeny bearing the same allelomorphs die out within two generations. Chromosome differences may also play a secondary part in the formation of such a sterility barrier between species.
This theory of gene synthesis has also a certain bearing on the causes of mutation and heterosis (cf. Abst. 1160 above).
The relation of the above considerations to the problem of evolution is touched upon.

1448. Crnjaković, D. 635.652:581.6(49.7)
Prinos poznavanju kvalitativnih svojstava našeg graha (*Phaseolus vulgaris* L.). Postotak i debljina ljuske te sposobnost razkuhavanja. [**Contribution to the study of the qualities of our beans (*Ph. vulgaris* L.). Percentage and thickness of skin and cooking quality**].
Poljodjelska Znanstvena Smotra, Zagreb 1944 : No. 8 : 57–71.
A study was made of twenty samples of *Phaseolus vulgaris* from some of the main regions of Jugoslavia, suitable for bean cultivation, and from the 1943 crop.
The percentage of seed coat was measured by weighing ten seeds and after soaking in boiling water, removing the skins, drying them and weighing them. The least skin percentage was found in the common variety Trešnjevac (*Ph. vulgaris* var. *ellipticus*) with 5·99% and the highest was in the variety Crnački Kralj (*Ph. vulgaris* var. *oblongus*) with 8·57%. Only 5% of the samples examined gave values below 6%.
The thickness of the skin was measured by projecting a section of the seed with a projection microscope and dividing by a factor corresponding to the magnification; the values obtained by this method conformed very closely to those obtained by actual measurements with a micrometer. The variety Trešnjevac had the thinnest skin (0·052 mm.) and Žibek Žuti the thickest (0·081 mm.).
The cooking capacity was estimated by boiling the beans in water in special aluminium containers; the samples were removed at intervals of 15 minutes and the number of beans in which the seed coat had burst was counted. The "cooking coefficient" $\frac{S}{t}$, where S is defined as the ratio of number of burst beans and t is the time of cooking. The best cooking quality was found in the variety Voštani Sabljaš; the varieties of the Trešnevac type were rather inferior in this respect, which therefore evidently is not conditioned by the thickness of the seed coat.

1449. Magruder, R. and
Wester, R. E. 635.653:575:581.162.32
Birth of a bean.
Sth. Seedsman 1946 : **9** : No. 3 : 16, 52, 57.
An account is given of the production of new lima bean varieties, with particular reference to the problem of natural crossing.

1450. 635.655(73)
Adapted varieties.
Soybean Digest 1946 : **6** : No. 5 : p. 22.
A map indicates the soya bean varieties adapted for cultivation in the different states. The map applies only to grain varieties.

1451. Cutler, G. H. and
Probst, A. H. 635.655:575(77.2)
Earlyana an early soybean for Northern Indiana.
Circ. Ind. Agric. Exp. Sta. 1943 : No. 286 : Pp. 8.
The new variety Earlyana is an early maturing yellow-seeded variety, developed from a plant which was probably a natural hybrid. Earlyana grows taller than Richland and its lower branches and pods are usually borne well above the soil, harvesting thus being facilitated. The new variety has equalled or surpassed Richland in grain yield. In limited tests of hay yield it has composed favourably with Richland. Earlyana possesses good chemical properties; it equals Richland in oil content but is superior to this variety in protein content and iodine number of the oil.

1452. MUNN, M. T. 635.655:581.142:581.6(74.7)
Producing soy sprouts.
Soybean Digest 1946 : **6** : No. 4 : p. 27.
The suitability of soya bean sprouts for processing has been investigated.

1453. SCULLY, N. J.,
PARKER, M. W. and
BORTHWICK, H. A. 635.655:581.143.26.035.1:581.04
Relationship of photoperiod and nitrogen nutrition to initiation of flower primordia in soybean varieties.
Bot. Gaz. 1945 : **107** : 218–31.
Varieties of soya bean differ in their reaction to photoperiod and nitrogen nutrition. The experiments quoted relate to flowering inception.

1454. GELIN, O. E. V. 635.656:575(48.5)
Weibulls Klosterärt. Ny förädling. (**Weibulls Kloster pea. A new production**).
Agri Hortique Genetica, Landskrona 1945 : **3** : 33–37.
The new Kloster (Cloister) pea variety has been bred from a cross between Weibull's Monopol field pea and the Ambrosia yellow table pea. It is a medium late type which boils well. In trials at Weibullsholm and the official trials, Kloster has outyielded all commercial varieties.

1455. WELLENSIEK, S. J. 635.656:575:578.08:631.557
Oogstanalyse I. Oriëntatie bij erwten. (**Yield analysis I. Orientation work with peas**).
Meded. LandbHoogesch. Wageningen 1941 : **45** : Pp. 29.
A detailed tabulated account is given of the results obtained from the full analysis of the average yield of 240–300 plants of each of 12 round green pea varieties, which were further checked, with satisfactory agreement, in application to a further 22 pea varieties. The average yield is considered in relation to the different morphological characteristics of the varieties, i.e. the total length of the stem, the number of sterile and fertile nodes, the average length of the sterile and fertile nodes, the average number of pods per fertile node and per plant, the average number of seeds per pod, and the average weight of one seed. There were indications that the average number of sterile nodes is a measure of the earliness of the varieties, and the average length of the internodes may be a measure of the stiffness of the straw.
It is pointed out that such average yield analyses, systematically conducted, may be usefully applied for plant breeding purposes, since it will allow the tracing back of both the defects and merits of the varieties studied, and the assessment of the possible value of a given variety as a parent in crosses. In the author's opinion, the analytical methods described should form part of a national breeding programme. V. A.

1456. LAMPRECHT, H. 635.656:575.116.1
Die Koppelungsgruppe *Oh-Ar-S-Wb-K* von *Pisum*. (**The linkage group *Oh-Ar-S-Wb-K* of *Pisum***).
Hereditas, Lund 1946 : **32** : 41–59.
An examination of the literature and the author's numerous pea crosses have shown that the genes *Oh-Ar-S-Wb-K* are linked in the order shown. Winge's data on linkage between *Ar* and *Bl* is reinterpreted as evidence for linkage between *Ar* and *Wb*, while Rosen's suggestion that *S-Wb-K* is linked to D-P_2...St-P_1 is discountenanced.

1457. ATABEKOVA, A. I. 635.656:576.354.4
(**Sporogenesis and gametogenesis in cultivated pea**).
Moskovskaja ordena Lenina Seljskohozjaïstvennaja Akademija imeni K. A. Timirjazeva. Naučnaja Konferencija 6–13 Dekabrja 1944 g. II. (Timirjazeva Agric. Acad. Moscow Rep. Sci. Conf. 6–13 December) 1944 (1945) : No. 2 : 72–73.
A brief description is given of the early prophase stages of microsporogenesis. The dual nature of the leptotene and pachytene threads was clearly visible.
The behaviour at megasporogenesis was more difficult to follow. Several sporogenous cells were sometimes observed in one ovule.

1458. WELLENSIEK, S. J. 635.656:581.162.5:581.45
De invloed der bladeren aan het steriele stengeldeel van *Pisum* op de ontwikkeling van de plant. (**The influence of the leaves on the sterile portion of the stem of *Pisum* upon the development of the plant**).
Hand. XXIIIe Ned. Nat.- en Geneesk. Congr. 161–64.
Since an increase in the number of fertile leaf buds on the stem in *Pisum* would be highly desirable from the breeders standpoint, it is of interest to test whether the leaf system of a particular race of *Pisum* can be induced to produce more fruits.
In this problem the leaves in the sterile portion of the stem are of special interest and the first point is to find out what influence the leaves on the sterile portion of the stem have upon the development of the plant and especially fruit and seed formation.
The removal of one leaf directly under the first fertile stem bud led to a fall of about 15% in the harvest; how far different races react differently must be investigated.

1459. GELIN, O. E. V. and SCHWANBOM, N. 635.656:581.6(48.5)
Om kokegenskapen hos ärter och dess natur. (**On cooking quality in peas and its nature**).
Agri Hortique Genetica, Landskrona 1943 : **1** : 75–96.
The necessary technique and the method of grading cooking quality were carefully studied, as well as time and place of storage. Differences in cooking qualities were found in tests of pea varieties. The best cooking result was obtained with the variety 720-29, followed closely by Östgöta Gulärt, Munk, Gyllen, Ambrosia II and Torsdags II.
The possibility of a relation between diastatic power and cooking quality was examined.

1460. WELLENSIEK, S. J. 635.656–1.521.5(49.2)
Het rassenvraagstuk in het algemeen, geïllustreerd aan erwten. (**The variety problem in general, illustrated by peas**).
Tech. Ber. Peulvruchten Studiecombinatie [1946?] No. 26 : Pp. 4.
This report of a lecture deals with the concept of variety and the identification of varieties; growers rights to the varieties they produce; choice of varieties for large scale cultivation; choice of parents for hybridization; and evaluation of varieties from the standpoint of heritable and environmental characters as well as yield, quality and subsidiary features.

1461. HARTER, L. L., ZAUMEYER, W. J. and WADE, B. L. 635.656–2–1.521.6(73)
Pea diseases and their control.
Fmrs' Bull. U.S. Dep. Agric. (Revised) 1945 : No. 1735 : Pp. 28.
References to varietal disease resistance are included.

1462. HUSÅS, Ø. 635.656–2.7:576.16:631.521.6
Ertegallmyggen. (**The pea midge**).
Tidsskr. Norske Landbr. 1940 : **47** : 123–37.
The suggestion is incidentally made that two biological races of the pea midge may exist, differing in regard to the portion of the plant in which they lay their eggs.
All types of peas (marrow fat, sugar, field and shelling peas, and even sweet pea) are subject to attack. Early sowing of an early variety is the best preventive measure.

1463. 635.656–2.8–1.521.6:575(77.5)
Wilt-resistant canning pea named for Prof. E. J. Delwiche.
Canner 1945 : **101** : No. 15 : p. 11.
A variety of canning pea resistant to both common wilt and near-wilt has been developed at the University of Wisconsin, and named Delwiche Commando. The variety is a sweet, mid-season pea with wrinkled seed.

1464. SINGLETON, W. R. 635.67:581.162.51:575.14
"Long husk" sterility in maize.
J. Hered. 1946 : **37** : 29–30.
An account is given of the very late yellow sweet corn inbred, Connecticut 95, whose long husk prevents pollination under natural conditions. Connecticut 95 is sufficiently tall to pollinate

the F_1 dent hybrids commonly used as seed parents, and the inbred is used for making sweet dent hybrids for silage and late sweet corn hybrids. As a pollen parent Connecticut 95 is useful since it sets no seed and does not draw as heavily upon the soil fertility as the seed rows.

1465. Doty, D. M.,
Smith, G. M.,
Reach, J. R. and
Sullivan, J. T. 635.67:581.192:578.08
The effects of storage on the chemical composition of some inbred and hybrid strains of sweet corn.
Bull. Ind. Agric. Exp. Sta. 1945 : No. 503 : Pp. 31.

Marked differences between inbred and hybrid strains are reported in sugar content at harvesting and the rate at which the sugars are converted into polysaccharides during storage at 68° F. for a period of 75 hours. Strains with high sugar content at harvesting and slow rate of sugar loss during storage showed a similar superiority from year to year. The value of these varietal differences in breeding hybrids which will maintain their sugar content during storage before marketing or processing is pointed out.

1466. Sievers, A. F.,
Lowman, M. S. and
Ruttle, M. L. 635.72:581.6:576.356.5:575.127.2
Investigations of the yield and quality of the oils from some hybrid and tetraploid mints.
J. Amer. Pharm. Ass. Sci. Ed. 1945 : **34** : 225–31.

Hybridization studies have been conducted with the mint species *Mentha longifolia* (L.) Huds., *M. rotundifolia* (L.) Huds., *M. spicata* L., *M. arvensis* L., *M. arvensis* var. *piperascens*, the Japanese mint, and *M. aquatica* L. Details are given of the yield and quality of the oil produced by the hybrids, also indications as to their rust resistance. Hybrids **31–44–4** and **31–44–12** of Japenese mint x *M. aquatica* produced oils whose total percentage of menthol was 57·60 and 60·84 respectively; these hybrids proved rust resistant but yielded poorly. Hybrids of Japanese mint and spearmint yielded well but the percentage of menthol was low. Tetraploids obtained by colchicine treatment of spearmint and the hybrid of Japanese mint x *M. spicata* had very low oil contents.

BOOK REVIEWS

SNEDECOR, G. W. 519.24:631.421

Statistical methods applied to experiments in agriculture and biology.

Collegiate Press, Inc., Ames, Iowa 1946 : $4.50. Pp. xvi + 485. tables.

By virtually rewriting this book in process of incorporating recent advances in the theory of statistics, the author has given to the world one of the very best text books on statistical methods. The applications are particularly to agriculture and biology. One can see that not only has the author taken great pains to master the methods under all conceivable variations of experimental design, but he is evidently able to put himself into the mind of the student and so answer the latter's questions before they are asked.

The order of the subject matter is unorthodox. Where else do we find the binomial and Poisson distributions taken in the sixteenth chapter of a book on statistics? But there is a logical reason for the order. One cannot begin too early with the idea of distribution of estimated parameters, and with significance and inference tests. Thus the "Student" distribution is reached in the third chapter, while the comparison of two groups occupies the fourth, paving the way for a detailed treatment of analysis of variance and covariance in chapters 10 to 12. But first a good deal of standard material is needed and so there are chapters on linear regression, correlation and χ^2, and on the computation processes in all that has been covered to this point. A more advanced section on multiple and curvilinear regression follows. The rest of the book is more miscellaneous, but is none the less interesting in rounding off the text to ensure that nothing of importance to the experimenter is missed.

A short course on statistics can be had by reading the first seven chapters, then going on to chapters 10 and 11, while a still shorter course is to follow the author's interjected remarks as to what to skip. But the whole book will well repay a detailed reading, and all methods are profusely illustrated by arithmetical examples. J. W.

JACOBS, M. B. (Editor) 54:633

The chemistry and technology of food and food products.

Interscience Publishers, Inc., New York 1944 : 1 : $10.50. Pp. xv + 952. 79 figs. 218 tables.

It would be difficult to over-emphasize the value of an up-to-date and comprehensive survey of the chemical and technological aspects of food. The book under review is the first volume of such a survey, produced by 41 collaborators, and it achieves a very high standard. The volume is divided into two parts, the first headed "Fundamentals" and the second "Foods".

The fundamental part deals very concisely, but in the main clearly, with physical chemistry, carbohydrate chemistry, lipoids, amino-acids and proteins, enzymes, vitamins, vitagens and hormones, minerals, colouring matters, digestion and food spoilage and food poisoning. Workers who are finding increasing difficulty in keeping abreast of the branches of organic chemistry and bio-chemistry concerned with food will find this a valuable, though not an easy, survey to bring them up to the position where they can follow current literature, as well as a most useful reference source for formulae, properties, distribution, methods, etc.

The second part deals *seriatim* with the different groups of foods: milk, cream and dairy products; meat and meat products; fish, shellfish and crustacea; poultry and eggs; edible oils and fats; cereal grains; baking and bakery products; vegetables, mushrooms, fruits and nuts; carbohydrates and sugar foods; confectionery and cacao products; coffee and tea; flavours, spices and condiments. These chapters describe the foods of the respective groups and give some account of their history, statistics, definition, standards, composition and chemistry. Some account is also given of their production and processing, but the main account of these aspects is to be given in the second and concluding volume. Since practically every chapter could form the basis of at least one book, the collaborators and the editor have achieved a remarkable success in condensing without becoming incomprehensible. This part of the book is again valuable both as an up-to-date introduction and as a reference source. The chapter on carbohydrate and sugar foods is unexpectedly biochemical in content for this section of the book, though none the less valuable for that. The most sketchy chapter is that on vegetables, mushrooms, nuts and fruits, probably reflecting the enormous gaps in our knowledge of this section of food plants; even so the tables of composition given are useful surveys in themselves.

This book will be indispensable to every research institute concerned with food in any way, and if the second volume maintains the standard set by the first, it is likely to remain a standard work for many years to come. J. L. F.

LE GROS CLARK, W. E. and
MEDAWAR, P. B. (Editors) 57:51
Essays on growth and form presented to D'Arcy Wentworth Thompson.
Clarendon Press, Oxford 1945 : 21s. Pp. viii + 408. figs. tables. pls.

Few conceptions have struck the imagination of biologists so vividly as Professor D'Arcy Thompson's comparisons of animal forms by the method of co-ordinate deformation. Ever since Descartes popularized the notion of the *machine organique*, efforts have been made to investigate properties of organisms by means of mathematical and physical techniques; and no more elegant method has been proposed than that already mentioned, in which a happy blend is effected between two Cartesian contributions to biological thought.

Since the first publication of *Growth and Form* in 1917, many attempts have been made to develop the mathematical analysis of living systems, and the book under review includes a notable selection of these.

Perhaps the first impression that is received from reading the various contributions is one of pleasure in the greatly increased power of modern analytical methods in physiological and mathematical research relating to biology. These are illustrated by Professor Le Gros Clark's essay on the mechanical causes of cerebral convolution, by Young's description of form determination in nerve fibres and by the paper of Richards and Kavanagh on the analysis of growth, in particular of allometric growth.

A most stimulating article on the forms of biological molecules is presented by Astbury, in which it is emphasized that many of the biological properties of such molecules as proteins, carbohydrates and nucleic acids seem to depend on their geometric configuration rather than on their chemical characteristics. This paper differs from the others in that the author appears justifiably excited at the expectation of remarkable results to follow soon in the field of cellular biochemistry. Geneticists will not need to be reminded that such studies are of paramount importance in elucidating the nature of growth and heredity.

Several papers are presented on detailed studies of animal development. That by Wigglesworth is of interest in that the author deprecates the emphasis placed by so many investigators on the cell in studies of development. He prefers to adopt a more holistic approach, regarding the organism as a chemical continuum or even as a giant molecule. Professor Berrill's study on ascidian embryology demonstrates that a significant relationship exists between size and ontogenetic behaviour, and he refers to data that re-open the question of the phylogenetic significance of ascidian ontogeny. Phylogenetic issues also arise from Willmer's paper on dedifferentiation in animal tissue cultures, the three basic types of cell arising therein being regarded as fundamental in an evolutionary sense.

Lotka's paper on population analysis stands apart from the others, both in its matter and in its reference to human society. It is fitting however that an article on the mathematical theory of natural selection should be represented, since this field has been found most amenable to mathematical analysis. The author's uneasiness regarding the evolutionary future of the human race is easy to understand.

All the papers mentioned so far as well as those still to be considered demonstrate the progress that has been made in recent years in the analysis of biological systems by means of mathematical and physical methods. Yet there is another *motif* running through this symposium, which in contrast to the main theme is in a minor key. It emerges for instance in Medawar's account of the different forms of growth curve, in which the author interrupts his exposition to observe that "it is the avowed object of most formal analyses of growth to discover something of the intimate mechanism of growing; but what may once have been sympathetic impatience for the successful outcome of this scheme is now giving way to resignation and doubt." Similarly, Reeve and Huxley, in a discussion of the mathematics of allometric growth, observe that many of the equations derived are devoid of a sound physiological basis. In a more restricted field, Danielli remarks that progress in knowledge of the surface tension values of cell membrances has thrown little real light on the general problem of cell form.

The difficulty is that the physical basis of life appears to be so complex that the prospects of comprehending it adequately are not promising. Yet, as Malebranche urged against the

Aristotelian biologists of his day, any attempt to explain biological phenomena in causal terms is vitiated by ignorance of the physical and chemical properties of the material substrate. It is possible to elaborate and refine mathematical and logical analyses of biological data even when ignorant of underlying causes. The danger is that progress in this field may be confused with progress in elucidating the fundamental nature of living things.

Perhaps the most significant work on theoretical biology that has appeared in recent years is Woodger's *Axiomatic Method in Biology*. Here, for the first time, the logical methods developed by Whitehead and Russell were applied to biological systems. In his article in the symposium, Woodger supplements his previous account by an analysis of the biological notions of correspondence and homology and their relation to phylogeny. His treatment conveys a precision to these concepts that has been lacking up to the present.

Yet it is important to realize that logical analysis, which includes mathematical analysis if the argument of the *Principia Mathematica* be admitted, does not further knowledge of the subject that it treats, but merely elucidates the implications of the premises. For this reason, ever since van Helmont cast his *Logica Inutilis* in the face of the logicians, experimentalists have been wary of mathematical and logical attempts to interpret their data. And it may be true that empirical investigation alone adds to the sum-total of biological knowledge. Recent work, such as that under review, has gone far to discredit the assumption that more elaborate knowledge of a biological system implies a concomitant penetration into its fundamental nature. It may be argued that even the most strictly physiological investigation into a system can produce no more than a purely descriptive explanation of a process whose fundamental nature is unknown and perhaps unknowable. Should this be true, physiology would be indistinguishable in essence from taxonomy, and the only criterion of a biological theory would be that of classificatory elegance, such as recommends a good dictionary or catalogue.

A chronological list of the published works of Professor D'Arcy Thompson concludes the book.

HOWARD, W. L. 575:007(73)

Luther Burbank, a victim of hero worship.

Chronica Botanica 1945–1946: **9** : 299–520. Published by Chronica Botanica Co., Waltham, Mass.; Wm. Dawson and Son, Ltd., London. (price $3.75).

Luther Burbank may be said to constitute the principal *quaestio vexata* of American genetical history. Whatever attitude is taken to his achievements and theories, he cannot be ignored. Many of his plant varieties have passed into standard use, or into the foundation breeding stock of agricultural research institutes. His ideas have been broadcast the world over and have contributed significantly to the mental attitude of the scientifically uneducated, especially in the United States but also to a lesser degree in other English speaking countries. Seen in historical perspective, it seems probable that the most important effects of Burbank's theoretical ideas have been realized in the Soviet Union, ten years after his death. Harwood's book, *The New Earth*, which was published early in the present century, contained an enthusiastic eulogy of Burbank's ideas, and it was translated by Timirjazev into Russian and attracted the interest of Lenin. Timirjazev's sponsoring of Burbank led to the adoption by Lysenko by many of Burbank's ideas, and has thus contributed an important element to Lysenko's present-day system of Soviet genetics.

The controvesy that hangs around Burbank's memory is fourfold. His breeding achievements have been variously described as epic in the history of plant breeding or worthless and largely fraudulent. His scientific theories have been regarded as showing remarkable insight into the nature of plants, or as mere nonsense. His character has been portrayed as angelic or as that of a common swindler. And his religious views have led to his being classified on the one hand as a Christian mystic and on the other to his becoming a hero of the free-thinking movement. Any definitive study on Burbank must elucidate all of these discrepancies.

Professor Howard entered on the task endowed with many qualifications. He had met Burbank and was for many years Director of the College of Agriculture of the University of California, in which state Burbank did most of his work. He has made a careful study of Burbank's varieties and has been in close contact with local opinion relating to Burbank. It is perhaps unfortunate that his book, the result of twelve or more years study, is not cast into normal biographical form, but consists instead of a number of chapters each devoted to a certain aspect of Burbank's life and work, the whole interspersed with personal anecdotes and asides.

In his attempt to present a true picture of Burbank's character, the author reveals much that is

unedifying. He portrays vividly the neurotic egotism that increased in Burbank as he grew older, also the sordidness of the business dealings in which he became involved. An unpleasant impression is given of the personal dispositions of many of the American scientists concerned in the controversies centering around Burbank, also of the snobbishness and institutionalism of university teaching staffs. The vulgarity of Burbank's advertising compaigns, the misused powers of the popular press in all matters relating to him and the hysterical controversy that arose concerning his religious views are further unpleasant features that emerge from this account. On the positive side, the author succeeds in clearing Burbank from some of the charges brought against him, in particular as regards the extent to which he was involved in the Luther Burbank Press, the Luther Burbank Society and the Luther Burbank Company. A useful list is also given of Burbank's plant breeding achievements, which include the Himalaya blackberry, the Wintersteín apple, the Abundance, Beauty, Burbank, Eldorado, Formosa, Santa Rosa, Satsuma and Sugar Prune plums, the Van Deman quince, the walnut varieties Paradox and Royal,the Burbank potato and the rhubarb variety Australian Crimson Winter.

By far and away the most valuable parts of the book are those quoting local opinions on Burbank, either from the Californian press or from statements made to the author, verbally or in writing by people who knew Burbank personally. Such information will be of great value in all future studies on Burbank's career.

Professor Howard assures us of his desire to present an unbiassed portrait of his subject, but in spite of all the valuable information he gives, it is hardly possible to admit that his book fulfils this intention. For one thing the author is far too busy grinding his own axe against the mental attitude of university trained scientists, and for another, his disconnected treatment, his inadequate understanding of Burbank's peculiar psychology, and his tendency to ignore Burbank himself and concentrate on other people's opinions of him, all detract from the value of what is primarily a biographical study. In this connexion, the author's inordinate attachment to the questionnaire must be held partly responsible. The book abounds in irrelevancies, a few entertaining, but the majority unbalanced calumnies of points of view with which the author lacks sympathy.

The book is a bad biography but all future biographers and all those interested in Burbank should read it.

575:633

BONVICINI, M. 575:633(45)

Miglioramento genetico delle piante agrarie. (**Genetic improvement of agricultural plants**).

Unione Tipografico-Editrice Torinese, Torin 1942 : Pp. viii + 306. 172 figs.

A general account is given of the reproductive system of the higher plants, and of the various anomalous forms it may take such as parthenocarpy, polyembryony etc. and of vegetative reproduction. The mechanism of inheritance, according to the classical Mendelian interpretation, is described, the more complicated cases of multiple factors, inhibitors, sex linkage etc. being included. Chapters are devoted to mutation and to systematics; in the latter some observations are given regarding the impact of genetics and also of the phytogeographical principles established by Vavilov and others. In the chapter on heredity and development, due emphasis is placed on the importance of the interaction of hereditary constitution and environment for the production of the phenotype.

Precise instructions are given in Chapter VII for carrying out the actual operations of selection in self-fertilized, cross-fertilized and asexually reproduced plants. According to the most modern viewpoints it might be felt that the need for homozygosity in an agricultural variety is over-emphasized, or at least taken too much for granted. An excellent account, however, is given of the characters required in a successful plant breeder and of the methods and need for regional testing of strains resulting from selection or hybridization. There is also a chapter on seed production. The more long-range problems such as interspecific hybridization and induced mutations are given only passing reference.

The latter part of the book is devoted to special accounts of the breeding problems in individual crops; the plants dealt with are those of most importance to Italian agriculture, and in this section some interesting details are given regarding the methods and achievements of Italian breeders in wheat, barley, oats, rice, maize, potato, hemp and various herbage plants. The section on wheat contains also a full outline of the existing knowledge on the genetics of the genus *Triticum*.

WELLENSIEK, S. J. 575:633
Grondslagen der algemeene plantenveredeling. **(The principles of general plant breeding).**
H. D. Tjeenk Willink and Zoon N. V., Haarlem 1943 : Pp. xvi + 492. 78 figs. tables.

A wide knowledge of plant breeding, both theoretical and practical, acquired in the Dutch East Indies and other countries has been brought to the compilation of this work. The author, who is a member of the Plant Breeding Institute at Wageningen in Holland, has come into close contact with the problems confronting the breeder of many different crops and he has found that often certain methods applied to particular crops are inadequately known among breeders of other crops. Consideration of this situation led him to evolve and compile a general system of plant breeding, in which the principles for the breeding of all crop plants are united into one system.
The wide range covered in the 14 chapters of the book is evident from the following résumé of the contents:—
Chapter I, initial material for breeding, races, the genetic and cytological basis of breeding; chapter II, the importation of and the origin of cultivated plants according to Vavilov; chapters III and IV, variation and natural and artificial mutation, hybridization and its techinque, floral biology, incompatibility, developmental physiology (including length of day and vernalization), adaptation and vegetative reproduction; chapters V and VI, selection in breeding and heterosis; chapter VII, classification of plants according to the system of selection to which they are suited, the grouping here being based *not* on self-fertilization and cross-fertilization, but on the new standpoint of a general system of breeding embracing all plants—the elements of the scheme here further elaborated have been published elsewhere; chapters VIII and IX, the maintenance of selected races and clones, a discussion of the breeding method *de choix* for a particular plant; and chapters X–XIV, detailed treatment of the breeding of the potato, tea, tobacco, beet and rye.
A further guarantee of the value of this text-book is afforded by the names of the author's collaborators, A. E. H. R. Boonstra, J. C. Dorst, J. A. Honing and H. van Rees.
The volume is illustrated throughout and is completed by a bibliography of 305 references, classified by subject, and a subject index. The style is clear and the useful definitions given of technical terms are especially welcome in cases where ambiguity resulting from loose usage has crept in.
The printing has been excellently done and the author, his collaborators and the publisher are to be congratulated on their work.

HUDSON, P. S. and
RICHENS, R. H. 575.1(47)
The new genetics in the Soviet Union.
Imperial Bureau of Plant Breeding and Genetics, Cambridge 1946 : 6s. Pp. 88.

There can be little doubt that the history of genetics in the Soviet Union during the past ten years will earn for itself a permanent niche in the history of science generally. For the first time in history, a school of scientific thought has arisen, based on a particular philosphy, in this case dialectical materialism, and has so effectively gained official support, that it has been able to establish for itself a position far more favourable in many ways than that of its rivals.
As seen by the rest of the world, the new Russian school of genetics, as developed by Lysenko and his colleague Prezent, is a strange and disturbing enigma. A few writers outside the Soviet Union have attempted to support it, mainly on ideological grounds, but in general it has been condemned outright as unscientific and oppressive. Yet till the appearance of this bulletin, the controversy that raged around Lysenko's name was largely a matter of prejudice, since so few relevant data were to hand to afford grounds for an adequate scrutiny. This objection no longer holds for one section of this bulletin is devoted entirely to recounting the voluminous evidence put forward by Lysenko and his followers in support of their theories.
The authors have adopted the unusual policy of prefacing their account of Lysenko's theory by two chapters on the historical and psychological background against which it has developed. It is hardly possible to deny the relevance of these considerations after having read the complete account.
It becomes clear from the bulletin how fundamentally Lysenko's scientific ideas have been

shaped by his interpretation of the principles of dialectical materialism, by his zealous attachment to the writings of Darwin, Mičurin, Timirjazev and Burbank, and by the numerous "alogical" methods of thought described by the authors in chapter III.

The theoretical structure reared by Lysenko on the basis of his own researches is described in chapter V, and will probably appear very strange to most non-Russian readers. Possibly the authors have erred in their efforts to present Lysenko's theory as coherently as they have; for in Professor Dobzhansky's recent translation of Lysenko's own monograph *On Inheritance and its Variability*, the theoretical coherence of Lysenko's ideas is far less easy to discover, and many points in it can only be understood at all when seen in the historical perspective which this bulletin seeks to portray.

The sixth and final chapter of the account is devoted to a description of the various arguments urged by Lysenko against Mendelian genetics. On this topic Lysenko is not seen at his best. After having read this monograph, the reader will realize the necessity of extreme caution before coming to any final conclusion on the merits or demerits of Lysenko's theories. The authors have written with extreme impartiality, and, confining themselves to describing and explaining the relevant facts and theories, do not allow themselves the liberty of taking sides on this most controversial subject. Nevertheless, the value of this publication is very great, both to geneticists and scientists generally. The authors have dealt almost exclusively with the original Russian literature, almost unknown to the scientific world at large, and in their care to avoid any suggestion of bias in translating, have inserted in the form of footnotes the original Russian of all relevant quotations translated in the text.

This bulletin is likely to become the standard work in English on this extraordinary phase in the history of science.

GRIMES, C. W. 576.12

A story outline of evolution.

Bruce Humphries, Inc., Boston 1944 : $2.00. Pp. viii + 244.

According to the author's preface the object of this book "is to present to the reader in simple language and in the fewest words a comprehensive story of the development of life". It is divided into two parts dealing respectively with cultural evolution and organic evolution. The whole is coloured by the author's religious preconceptions.

The book is obviously not intended to contribute anything new to the study of evolution, but even as a popular account it cannot be recommended. It is badly written, vague and very inaccurate. One or two examples will suffice to show the standard achieved. On p. 17 we read: "Like the animals of today, the stench of putrefaction was pleasing to his [early Mousterian man's] sense of smell". The author obviously means that early Mousterian man resembled the animals of today in liking the stench of putrefaction, a preference which no doubt may be correctly ascribed to certain scavenging animals, but surely some supporting evidence is needed before it can be ascribed to prehistoric man. On p. 32 we are informed that the combine harvester-thresher "cuts, *binds*, thrashes and sacks the grain" (our italics). The account of the development of the steam engine jumps from Watts' condensing engine to the turbine.

The account of organic evolution is, if anything, worse than that of cultural evolution. Apart from being written in an extremely teleological style, it betrays throughout a complete lack of first-hand acquaintance with living plants and animals, a lack which sterilizes most of the chapters.

J. L. F.

WHITE, M. J. D. 576.31:576.12

Animal cytology and evolution.

Cambridge University Press, London 1945 : 36s. Pp. viii + 375. 121 figs. 18 tables.

The many striking parallels between the genetical and cytological systems of plants and animals have fostered the supposition that the two biological kingdoms differ far more in their external morphology than they do in their underlying determinative mechanisms. The similarity between the cellular construction, nuclear morphology and biochemistry, and mitotic and meiotic behaviour of plants and animals has been often remarked. Moreover, the practically universal manifestation of Mendelian inheritance in genetical studies has apparently clinched the evidence provided from other investigations.

Dr White however dispels this illusion. In a very comprehensive review of metazoan cytology, he shows clearly how wide a variation there exists within the animal kingdon in respect of cytological characteristics, and he describes also many important cytological mechanisms, peculiar to animals or to some animals, which are absent or unimportant in plants.

Thus, somatic pairing, endomitosis and many highly anomalous types of meiosis are rare outside the animal kingdom. On the other hand, polyploidy and wide hybridization appear to be of considerable significance only for plants. The salivary gland chromosomes of the Diptera have permitted an extremely delicate analysis to be made of chromosomal evolution within this group, but there seems to be no immediate prospect of an analogous analysis being made elsewhere.

In his general outlook, the author reveals a buoyant and confident neo-Darwinism such as now rejoices in the appellation of orthodox. He therefore trounces Goldschmidt when occasion arises, believing that the regular intergradation between small variations and interspecific differences can be extrapolated to cover the whole of the domain of biology. Yet, in contrast to the more Darwinian wing of neo-Darwinism, he is at pains to demonstrate that the role of natural selection can be over-stressed, and lead to the neglect of the evolutionary significance of the internal cytogenetical system. By assembling a wide range of examples with very different genetical and cytological mechanisms, he goes far to justify this criticism. It is also useful to have to hand further evidence of the lack of correlation between cytological and genetic systems on the one hand, and morphological and physiological systems on the other. That the same gross characteristics of an organism may be determined by many widely different underlying genetical and cytological mechanisms is of considerable evolutionary importance.

It is only natural that in a book on animal cytology, much space should be devoted to sex determining mechanisms, and here plant breeders and geneticists will find a useful review of single and multiple sex-chromosome systems and of sex determination by the alternation of anisoploid generations (haplodiploidy).

An interesting account is given on p. 75 of the author's theory of crossing-over. It is postulated that the split within each prophase chromosome develops asynchronously, thereby producing regions of strain between already split and as yet undivided parts of the chromosome. These regions of strain, which are possibly associated with heterochromatin blocks, are believed to determine the loci of the chiasmata.

The value of assembling such a wide range of factual data as Dr White has succeeded in doing is in itself sufficient justification for this book. Yet it is only reasonable to inquire what biological significance these facts bear, and what conclusions may be drawn from them. To these questions, the author himself admits that the work of interpretation is still only in its infancy, partly because the facts are not yet sufficient for comprehensive generalization. The author is eager to show that genetical systems are not static entities which persist unmodified during the evolutionary development of the accompanying external morphology. That cytogenetic systems have as complex an evolutionary history as morphological systems is apparent from the author's review; as to the details, however, of this evolution, we probably know as much and as little as we do of morphological phylogenesis. The comparative study of cytogenetical systems is however still so young that a dearth of theoretical consequences is only to be expected. But in one case it does appear that cytological findings may lead to definite phylogenetic conclusions. This is with regard to gene sequences. The chances of any particular chromosomal rearrangement being repeated are regarded as negligible, and therefore it is believed that the presence of such rearrangement in two different forms can be taken as certain evidence of their monophyletic origin

It is perhaps unfortunate that the author follows the orthodox neo-Darwinian line in equating species and breeding units. This approach obviously breaks down in respect of asexually reproducing and parthenogenetic forms, all of which have to be classified by systematists. So often do specialists assume that the criteria that they examine must be of primary diagnostic importance, that they forget the relevance of other taxonomic data. The systematist should evaluate the taxonomic importance of all the characteristics of the organisms that he is considering, and though in fact he often shows undue attachment to traditionally studied morphological features, this shortcoming does not justify decrying morphological characters in favour of such cytogenetical techniques as the investigation of sterility barriers. The species concept long antedates the concept of the breeding unit; it is not equivalent, and, though the latter should be used in evaluating taxonomic categories, it should not be employed to the detriment of other equally important characteristics.

BAKER, J. R. 576.31:578.6

Cytological technique. The principles and practice of methods used to determine the structure of the metazoan cell.

Methuen and Co., Ltd., London 1945 : 2nd Edition. 6s. Pp. vii + 211. illus.

The first edition of this useful guide to cytological technique was published in 1933 and reviewed in *Plant Breeding Abstracts*, Vol. V, p. 166. The second edition follows the same plan, but has been enlarged, modernized and largely rewritten. The book deals with the techniques of animal cytology, and by the plant cytologist it will probably be regarded as a supplement to Darlington and La Cour's *Handling of Chromosomes* (1942). It is well worth reading, for the practical details given, for the account of the principles involved and for the attempt to relate what is seen in the fixed and mounted cells with what can be seen in living cells and what is believed to exist in them. J. L. F.

PIGMAN, W. W. and
WOLFROM, M. L. (Editors) 576.31:581.192

Advances in carbohydrate chemistry.

Academic Press Inc., New York, 1945 : **1** : $6.00. Pp. xii + 374. figs. tables.

This is the first of a series of annual volumes to be made up of critical integrative reviews of researches in the chemistry of carbohydrates, including sugars, polysaccharides and glycosides. It comprises eleven articles by different authors, of which the only one of interest to students of heredity is that by R. S. Tipson on "The Chemistry of the Nucleic Acids" (pp. 193 to 246).

The study of the role of ribose nucleic acid and desoxyribose nucleic acid in living cells is still in its infancy. Enough has been published in recent years, however, to indicate that a clearer understanding of the biochemical and physiological activity of these substances will produce revolutionary changes in our ideas on cell physiology and especially with regard to the behaviour of the nucleus itself and its control over the cell's activities. To the cytologist and geneticist, the work of most direct interest is that concerned with the nucleic acids *in situ*. Suitable stain and ultra-violet absorption techniques demonstrate their distribution in relation to structures already known in the cell and enable us to learn something of their behaviour in relation to that of the cell. It is possible that the key to the problem of the transfer of energy in many cell processes will be moulded from studies on nucleic acids and nucleotides. Be that as it may, there is no doubt that many branches of science are converging on these substances—physical chemistry, organic chemistry, biochemistry, physiology, embryology, cytology, genetics and virus studies. The efforts of the organic chemists and bio-chemists to elucidate the chemical structure of the nucleic acids may be regarded as basic to all the other work. In this lies the value of the authoritative review before us.

The author presents a closely reasoned account of the unravelling of the complex structure of the nucleic acid as far as it has proceeded to date. Both ribose and desoxyribose nucleic acid (yeast nucleic acid and thymus nucleic acid) are shown to be built up of equimolecular proportions of four nucleotides. The nucleotides are each composed of a nucleoside and phosphoric acid, the nucleosides in turn being built of a base and a sugar, only one sugar being found in each nucleic acid. The differences between the two nucleic acids are brought about mainly by their different sugars, *d*-ribose and 2-desoxy-*d*-ribose; the bases found in ribose nucleic acid are adenine, guanine, cytosine and uracil, while in desoxyribose nucleic acid thymine (5-methyluracil) occurs instead of uracil. The bases had all been identified by 1903, and in 1909 Levene identified the sugar of yeast nucleic acid. Not until 1929 did the same worker identify the sugar of thymus nucleic acid. From then on the story becomes increasingly complex as the structure of the nucleotides is elucidated, and it is fascinating to read how the general advances in organic chemistry and biochemistry enabled this structure to be worked out. The structural formulae for the nucleotides are not yet all known with certainty nor is their method of joining together to form nucleic acids, though reasoned suggestions have been advanced. Both nucleic acids are highly polymerized in the native state, specimens of desoxyribose nucleic acid with a molecular weight between 500,000 and 1,000,000 having been obtained, and there appears to be some doubt whether the fundamental unit composed of four different nucleotides can be obtained as a pure substance.

All interested in the nucleic acids will find this survey worth careful study. J. L. F.

Lowson, J. M. 58
Textbook of botany.
Revised by W. O. Howarth and L. G. G. Warne.
University Tutorial Press, Ltd., London 1945 : 9th Edition. 12s. 6d. Pp. viii + 584. 413 figs. 8 pls.

It has become a commonplace that botanical text-books in general fall very short of the standard of accuracy that is requisite in introducing a student to a university curriculum. Gross over-simplification of the complexities of biological phenomena and dogmatic interpretations of the facts are far too frequent in such books, and do great harm to potentially critical students. Perhaps the principal cause of this state of affairs is the misconception held by many authors that the dogmatic teaching methods of our secondary schools should be perpetuated in the universities and technical colleges. Yet it is true to say that a large part of the energies of a university teacher must be directed to erasing the unfortunate notions instilled into his students' minds by secondary school teachers. It is not that facts are usually misrepresented, but rather that theories with no more than a possible truth value are taught as definitive.

Lowson's *Textbook of Botany* has had a long history in this country and the present edition revised by Howarth and Warne differs much from its original progenitor. In many ways it is the best intermediate text-book of botany now available. A terse and clear style and a sufficient number of adequate diagrams are important recommendations. In addition, it includes many references to recent research discoveries, ignored by most of its contemporaries. Thus, the complexities of the life cycle of *Saccharomyces* are described, the significance of the spermatia of the rust fungi is elucidated, and the nature of the viruses is considered.

Yet, it is not possible to overlook several defects which should be remedied in subsequent editions. Several shaky conceptions are retained, such as Hanstein's histogens and de Bary's distinction between common, foliar and cauline vascular bundles. No effort has been made to represent the theory of homology in such a form as to render it immune from the destructive criticism recently meted out to it by American investigators, nor have the efforts of such analytical biologists as Woodger been recognized in recasting the concept of homology in a precise form capable of accurate usage.

Consequently, Goethe's theory of the foliar nature of the floral organs retains its inflated credit, though the editors do draw attention to contrary views in a later section. Far more serious is the travestry of the facts perpetrated in a discussion of the morphology of the Vitaceae. In most representatives of this family, the apical bud does not give rise to a tendril but continues the growth of the main axis. The tendrils arise from leaf-opposite lateral primordia, even though this behaviour may affront preconceived notions. Therefore, it is incorrect to term the axis a sympodium, although there are adequate grounds for pointing out similarities between the *Vitis* axis and a true sympodium. Such an instance of a plant deviating from a typical morphological plan is instructive in as far as students may learn from it that morphological generalizations are to be treated with caution. By mispresenting the facts to fit in with a preconceived morphological theory, the outlook of students is liable to become correspondingly stultified.

Kundu, B. C. 58(54)
A textbook of botany for junior students.
Dasgupta and Co., Calcutta 1944 : Pp. viii + 412. 219 figs.

A careful examination of the literature published in India on scientific subjects and related fields during the last ten years brings to light two divergent and mutually hostile schools of thought. On the one hand, there is a philosophically minded school steeped in the Sanskrit philosphical tradition of India, and chary of acknowledging the value of scientific achievements. On the other, there is a large and growing scientific element, trained originally in Europe, which has adopted whole-heartedly the scientific attitude of the west, and pours contempt on the Indian cultural tradition, as may be confirmed by perusing the pages of a journal such as *Current Science*. In both cases, these two bodies affirm their patriotic attachment to India, though this attitude often bears more resemblance to western nationalism rather than to an appreciation of cultural values.

Professor Kundu's text-book on botany illustrates several of the characteristics of the occidental school of Indian thought. His treatment is based on European models and is graced by a pleasing and succinct style. Practically the whole book is devoted to flowering plants, only two chapters dealing with the cryptogams. Illustrations are scattered liberally and are one of the best features of the book.

However, many of the least satisfactory qualities of European text-books appear here also. There is a serious tendency to over-simplify and to make statements that would be true only if carefully qualified. Teleological expressions are introduced without justification, formaldehyde is affirmed positively to be an intermediary in photosynthesis, homology and analogy are treated without reference to recent criticisms, while Goethe's hypothesis on the foliar nature of the floral organs is repreduced with no indication as to its flimsy foundation.

Such criticisms could of course be levelled against the majority of European elementary botanical texts, but in these cases, there is at least some excuse to be made on the grounds that the naivety of their morphological theories is only a hang-over from the early nineteenth century *Naturphilosophie* of Schelling and his successors. No such excuse can be admitted in the case of India, where far more exacting methods of analysing concepts have long been practised. The author's only concession to his environment is his addition of Bengali equivalents of plant names. If however, he had replaced the idealist morphological theories derived from Goethe, by, for instance, a strict analysis of his data according to the principles of the Nyãya philosophy, which has been developed particularly in Bengal, he would have performed a lasting service to Indian botany.

Till now, no synthesis has been effected or even approached between Indian philosophy and western science. Yet no academic exercise would do more to release the tension that is building up now in the present-day Indian *Weltanschauung*.

MERRILL, E. D. 58(9)

Plant life of the Pacific World.

MacMillan Co., New York 1945 : $3.50. Pp. xv + 295. 256 figs.

Few people have the gift of presenting scientific facts in such a way that they are both reliable, accurate, and palatable to the non-scientific public, as have the Americans.

A case in point is provided by Professor Merrill's contribution to the *Pacific World Series* sponsored by the American Committee for International Wild Life Protection. In this book a large body of facts has been brought together and presented in such a form that any visitor to Malaya or the oceanic islands can at least understand and appreciate something of the local flora.

After an introductory chapter, in which the author puts to rest any fears that might be entertained of man-eating trees, an account is given of the principles of classification and terminology, and then separate chapters follow on the more important ecological units such as the strand flora, mangrove swamp, and primary and secondary tropical forests. Weeds, cultivated crops, ornamental plants and jungle foods all receive attention. Of particular value in this section of the book are the numerous illustrations.

The second half deals with more general topics. Two interesting chapters are devoted to plant distribution, the first on the Malaysian flora, including of course a consideration of the Wallace and the Weber lines, and the second on the Polynesian flora, in which the author brings forward evidence for the western origin of most of the elements of the oceanic flora. It is wholesome to learn in the chapter on vernacular plant names, that many of the Malayan terms are more fixed than the corresponding Latin binomials. Short notes on particular islands, and historical and bibliographical material go to complete the book.

A slight tendency to repetition is tiresome at times, and the map on p. 217 has been printed upside-down, but these are only small shortcomings in an excellent popular introduction.

RABINOWITCH, E. I. 581.13

Photosynthesis and related processes.

Interscience Publishers, Inc., New York 1945 : **1** : $8.50. Pp. xiv + 599. 63 figs. tables.

Photosynthesis and related processes, the first comprehensive review of the subject to appear since Spoehr's monograph of 1926, has been written with an emphasis on the chemical and physical aspects of the process, in keeping with the trend of recent developments in this field. The work is planned in four sections, viz. (1) the chemistry of photosynthesis and related processes; (2) the structure and chemistry of the photosynthetic apparatus; (3) the spectroscopy and fluorescence of the pigments; and (4) the kinetics of photosynthesis. The first two of these sections make up the first volume. Photosynthesis in relation to plant ecology or systematics or to agriculture is not discussed.

In a general classification of chemical reactions, the over-all reaction of photosynthesis is included, together with some *in vitro* reactions, among sensitized photochemical oxidation-reductions.

Its especial interest lies in the existence of a mechanism permitting the utilization of the energy of several light quanta for the transformation of a single molecule and preventing back reactions which would tend to destroy unstable intermediate products. Against this background, and on the basis both of chemical and physical data and the results of experimental work on living material, the reaction sequences occurring in photosynthesis, chemosynthesis, and similar processes are discussed. While the various schemes presented are largely hypothetical, they greatly help to delineate clearly the problems involved, many of which are those of life itself. The interrelations of photosynthesis with other physiological processes such as respiration are clearly brought out. Although the author may arouse the suspicion of some physiologists when he states in his preface that his approach is that of a physical scientist, he has treated the subject with great appreciation of the complexity of the living organism and of the involved dove-tailing of physiological processes.

The style of writing is fluent and lucid, the introduction and historical chapter being particularly readable. There are a few misprints, the representation of inositol on p. 41 as containing a ring of pentavalent carbon atoms being perhaps the most startling.

This book is a valuable addition to the literature of plant physiology, not only because it presents a balanced and comprehensive account of the present position of our knowledge of the most fundamentally important of plants functions, but because of its outlook, one that many biologists would do well to appreciate. G. E. F.

KEARNEY, T. H. and
PEEBLES, R. H. 582(79.1)

Flowering plants and ferns of Arizona.

Misc. Publ. U.S. Dep. Agric. 1942 : $2.00. No. 423 : Pp. 1069. 29 pls.

The rich flora of Arizona has had to wait long for an adequate descriptive flora. According to the most conservative estimates, the number of species of the Spermatophyta and Pteridophyta is well in advance of three thousand, and the need of a flora is therefore beyond dispute.

In the publication under review, a successful attempt has been made to meet this need. All the flowering plants, conifers, ferns, *Equiseta* and other pteridophytes known to be indigenous to the state have been listed, together with keys for their identification. Although botanical descriptions are omitted except in critical cases, notes are included on the ecology and geographical distribution of each form.

A general introduction prefaces the systematic portion constituting the bulk of the volume, and this deals with the history of botanical exploration in Arizona, the plant geography of the state and its relations with the American flora as a whole; 163 endemic species are recognized. There is a short account also of the various ecological formations characterizing this region, and these are accompanied by photographs. Plates are also given for a few of the more noteworthy Arizonian species.

The authors display unusual discretion in their handling of vernacular names, only applying English, and occasionally Spanish equivalents, where there is some justification for doing so. Information is also presented on the uses of the plants, including Indian applications.

YOUNG, C. B. F. and
COONS, K. N. 6

Surface active agents, theoretical aspects and applications.

Chemical Publishing Co., Inc., Brooklyn, N.Y. 1945 : $6.00. Pp. x + 381. figs. tables.

The Chemical Publishing Company of Brooklyn has been one of the most active sponsors of publications on applied science. This book on the technical applications of research on surface tension is a characteristic product, and is a useful compilation of the rather miscellaneous information relating to surface active agents.

Most of the chapters are devoted to the technical utilization of surface tension phenomena, though there is an introductory section on the theoretical principles involved. This account is elementary and not likely to detain most of those who will consult the book. The description of methods for measuring surface tension and contact angles is likely to be useful, and this is followed by a comprehensive list of wetting agents, detergents and emulsifiers, together with remarks on their individual uses.

Separate chapters have been written on the use of surface active agents in the preparation of emulsions, in metal cleaning and industrial processes depending on it, in the cosmetic and leather

industries, in the flotation method of separating mixtures of finely divided solids, and in the manufacture of printer's ink. A more detailed account is given of the many applications of surface tension studies in the textile industry, and shorter chapters succeed on cutting oils, adhesives, food processing, lubricants and solders.

The book is not well printed and the authors' style is often unpleasing, but it serves its primary purpose adequately, and the bibliographies at the end of each chapter will be of value to those who wish to follow up further any particular application of research on surface tension effects.

HONIG, P. and
VERDOORN, F. (Editors) 6(92)

Science and scientists in the Netherlands Indies.

Board for the Netherlands Indies, Surinam and Curaçao, New York City 1945 : **102** : Special Suppl. £1. 1s. Pp. xxii + 491. 134 figs.

In this encyclopaedic account of the development and present state of science in the Dutch East Indies, the editors have used the technique that has now become associated with the publications brought out under the auspices of *Chronica Botanica*. A useful series of articles, some original, others reprints from other publications, most in English but others in French or German, have been brought together under one cover, in order to offer to the reader a panoramic view of the subject treated. That this book will be of great value to anybody interested in the Malay Archipelago goes without saying. The topics treated include pure and applied botany, with special reference to the rubber and cinchona industries, forestry and tropical agriculture, zoology, including research on fishery, and geography and geology with separate articles on volcanic activity, earthquakes and climatology. Studies directly concerned with human affairs are also mentioned, including, for example, papers on medical research, nutrition, ethnology and archaeology. Interspersed with the more strictly scientific articles are others of a more anecdotal type, also historical sketches and travellers' reminiscences; the names of Rumphius and Treub receive honourable mention.

While the reader will be grateful for the abundant fare provided, he will not find it so easy to reconcile himself to the formlessness of the compilation. The articles in the first part of the book follow each other according to the alphabetical order of their authors' names. A series of articles on the Tjibodas Biological Station follow these, then a paper on wild life conservation, and finally a miscellaneous assortment of supplementary articles, largely bibliographical or generally informative. It would be churlish to underrate the value of such a work, but it is difficult to avoid the feeling that a desire to save labour has dictated a somewhat patchwork method of editing.

631:016

Bibliography of Soil Science, Fertilizers and General Agronomy 1940-1944.

Imperial Bureau of Soil Science, Harpenden, 1946 : 25s. Pp. 567.

This volume of the "Bibliography of Soil Science" forms an index to Volumes IV–VII of "Soils and Fertilizers" published by the Imperial Bureau of Soil Science. The bibliography is arranged according to the universal decimal system of classification, and is a particularly convenient source of information, containing a main bibliography under subject headings, geographical bibliography, author and subject indices, and a handy list of abbreviations of journals and periodicals.

BECK, F. V. 631.531.12:519(73)

The field seed industry in the United States.

University of Wisconsin Press, Madison, Wisconsin 1944 : $3.00. Pp. xxii + 230. 49 figs. tables.

In an economy dependent upon price as the decisive factor, the legume and grass seed industry is liable to show considerable price fluctuations, involving more than ordinary financial hazards, largely due to the differences in the seasonality of the wholesale and retail trades. This book has been compiled with the aim of reducing this uncertainty, by providing the seed industry with economic statistics which should be helpful in adjusting future policies of production and distribution. Chapters are devoted to the development of the grass seed industry in the United states; the economics of production, distribution and consumption of seed crops; seasonal and geographical patterns of seed sales; price and price trends; prices of seed in relation to other farm prices; factors affecting seed prices; and the commercial movement of seed crops. It also

contains 57 tables of detailed data on prices, production, consumption, and sales of seed crops, and 50 illustrative maps and charts. The analysis is a comprehensive source of information, and it should be useful not only to those engaged in the seed industry, but by the methods of presentation and interpretation useful also to those giving attention to similar studies of other crops.

SMITH, G. 632
An introduction to industrial mycology.
Edward Arnold and Co., London 1946 : 3rd Edition. 20s. Pp. xiv + 271. 143 figs. tables.

Until the first publication of this book in 1938, no textbook on the fungi which play beneficial or degradative roles in industry was available, and it has thus answered an important need. Its purpose is to assist the scientific worker, wishing to study the fungi for industrial purposes, who has little or no biological knowledge; and besides the chapters describing the various genera important to industry, chapters are included on laboratory methods. The book forms a first-class textbook, illustrated by a large number of excellent photomicrographs. One chapter is devoted to a discussion of the diverse beneficial uses of the moulds in industry, subject to war-time restrictions. Since the appearance of the first edition, the study of biochemical changes brought about by the moulds has become a rapidly developing branch of biochemistry, and it has attracted world-wide interest by the large scale use of penicillin.
Furthermore, recent investigations on certain fungi have linked the genetical and biochemical approaches. In the case of the yeasts such studies are likely to have an important effect upon the brewing and distilling industries. In view of such developments, a third edition of so excellent a textbook, containing certain additions and alterations, is opportune.

ARROYO, R. 632.422.3(72.95)
Studies on rum.
Res. Bull. P.R. Agric. Exp. Sta. 1945 : No. 5 : Pp. ix + 272. 38 figs. 47 tables.

In recent years the rum industry in Puerto Rice has developed rapidly. This book describes work carried out during the years 1936–42 to provide the growing industry with a sound scientific basis and the advantages of modern technical methods, in place of empirical obsolete practices. The research covered as far as possible all the technical aspects of rum manufacture. Chapters are devoted to each of the following subjects: the raw material, yeast selection, mashing operations, mitogenetic radiation, rum fermentation, rum distillation, rum curing and maturing, rum aroma, rum composition and appraisal, and biological and chemical control of the rum distillery. The book is an important contribution to the progress of the rum industry. In each of the separate stages involved in rum manufacture, sound principles of procedure have been established, much new information has been secured, and a fertile basis laid for future research in the various problems of the rum industry. The essential difference between the distillation of industrial alcohol and rum is emphasized as the result of the investigations. By radical changes in fermentation methods new types of rum have been produced, including types similar to the Jamaican heavy rums, the development of which is obviously likely to have a considerable effect upon the rum market. Of particular interest is the work on the selection of yeast. The proper selection of yeast was found to be the foundation of successful distillation; on the other hand improved technical methods of rum analysis and manufacture enable a more precise use to be made of yeast variability. The author envisages that the breeding of rum yeasts will be undertaken in the not too distant future. Of interest also is the chapter on mitogenetic radiation. The investigations gave evidence in support of Gurwitsch's work on the phenomenon.

RHIND, D. 633.2(59.2)
The grasses of Burma.
Baptist Mission Press, Calcutta 1945 : 7s. 6d. Pp. 99.

In 1941 a sheet of each species of grass in the Mandalay Agricultural College was sent to Debra Dun for safe keeping, but unfortunately, much unpublished information on the grasses of Burma was left behind and lost during the Japanese invasion. The present publication is an attempt to gather together what knowledge remains of the Gramineae of Burma, and makes use of the above material together with material in other herbaria in India and of previously published works. It aims not at being a complete detailed description of the whole family, for the author stresses that many areas have been insufficiently collected in the past, but rather is a list of present known species which should form the basis of a larger work in the future. Where the species listed is new

or has been described in less readily accessible publications a full description is given, otherwise a reference is given to the standard floras. Useful keys have been provided to the tribes, genera and species, and the vernacular names have been included though the author indicates that these are of little practical use for purposes of identification. There is a list of fungi recorded on grasses in Burma, a glossary of descriptive terms, a glossary of vernacular names and a very useful index to the botanical names. Though a wartime production the printing is very good. and the paper and binding satisfactory. Anyone engaged in field work in Burma should find this a very helpful pocket guide, while those studying in herbaria can hardly afford to be without it. C. M. D.

CORE, E. L.,
BERKLEY, E. E. and
DAVIS, H. A. 633.2:582(75.4)

West Virginia grasses.

Bull. W. Va Agric. Exp. Sta. 1944 : No. 313 : Pp. 96. 40 pls.

In this excellent account of the grasses of West Virginia, the authors have compiled an illustrated monograph that should prove of permanent value. After a short introduction on the history of grass studies in the state, and on the uses to which the wild grasses have been put, the main part of the bulletin follows. In this, short taxonomic descriptions are given of all the wild grass species of West Virginia, together with notes on their ecology and distribution within the state. A particularly valuable series of illustrations of the inflorescences and spikelets of each species accompanies the text. The classification is based on Hitchcock's manual and keys are provided whenever necessary.

633.71:575.1
KOSTOFF, D. 633.71:575(49.7)

Cytogenetics of the genus *Nicotiana*. Karyosystematics, genetics, cytology, cytogenetics and phylesis of tabaccos.

State's Printing House, Sofia 1941–1943 : Pp. xxviii + 1071. 345 figs. tables.

As *Nicotiana* has been a popular subject for studies in heredity since Kölreuter's work on sex in plants (1761), a monograph on its cytogenetics is indeed a formidable task. Professor Kostoff's wide experience in this genus entitles his survey to serious consideration.

The major part of the volume is written in Bulgarian, but each chapter has an extensive summary or abridged translation in English. The first two chapters, dealing respectively with the caryosystematics of *Nicotiana* and hybridization in the genus before 1900, lay the foundation for the exhaustive account of the modern work which follows. This is covered in three chapters, covering genic analysis, interspecific hybridization and gene mutations and chromosome changes. A sixth chapter deals with the relationship and phylogeny of tobaccos. The largest chapter is that on interspecific hybridization, which deals with no less than 181 different crosses. Many of these have been made reciprocally and several have given rise to amphidiploids. An interesting section in the fifth chapter deals at some length with haploids of parthenogenetic and androgenetic origin.

The book is amply illustrated with a coloured plate, photographs, drawings and maps. Tables are extensively used throughout the text and the bibliography runs to more than 30 closely printed pages. There is no index, but the table of contents is sufficiently detailed to avoid the need for one.

Only a specialist in *Nicotiana* could correctly evaluate the accuracy of this contribution, but to geneticists in general it will be evident that it is of more than usual scope and interest. To have produced it in wartime is indeed an achievement and on this ground one can readily excuse the rather wild grammar and spelling in the English parts. J. L. F.

634.25(82)
GRÜNBERG, I. P. 634.22(82)

Variedades de durazneros y ciruelos que se cultivan en el país. (**Varieties of peaches and plums which are cultivated in the country**).

Biblioteca Agronomica y Veterinaria, Facultad de Agronomia y Veterinaria, Universidad de Buenos Aires, 1944 : **6** : Pp. 453. 78 figs.

In this book, Professor Grünberg has compiled a useful account of the peach and plum varieties cultivated in Argentina. After an introductory section on the history of commercial fruit growing in that country, he deals with problems of organization and the choice of appropriate varieties.

The major portion of the book contains botanical descriptions of each variety of peach and plum; and this part includes information on the distinguishing characters useful in varietal discrimination, and also keys for varietal identification. Under each variety, in addition to the technical description, there is a brief account of the bibliography relating to the variety, its synonymy, its genetical origin, the extent of its cultivation in the Argentine, and practical details likely to be of interest to growers. The description of each variety is accompanied by an illustrative plate of the fruit, some of the plates being in colour.

JONES, G. N. 634.741:582

American species of *Amelanchier*.

University of Illinois Press, Urbana, Illinois 1946 : $1.50. Pp. 126. 23 pls. 14 maps.

The genus *Amelanchier* has long proved a difficult one for the systematist to handle. Estimates as to the number of North American forms have ranged from one to a very large number, almost two hundred names having been published. Dr Jones's monograph is therefore a timely contribution to a vexed problem.

In his treatment, eighteen North American species are recognized, and to each of these is devoted a full botanical description, a fearsome list of synonyms, and full notes on ecological habitats and geographical distribution. Maps are added to illustrate the latter, also plates of the type specimens of the species described.

The importance of this contribution to our knowledge of this genus can hardly be over-emphasized. Whether, however, it will prove definitive is another question. The intraspecific variation in many species is, according to the author, often greater than the interspecific differences. Leaf form is very variable, depending largely on the age of the plant and the time of year at which it is examined. It is probable that the taxonomy of the genus *Amelanchier* will only be adequately understood when studied according to the principles of population genetics; until this is done however, Dr Jones's monograph will be of immense value to all those studying this difficult group.

634.775.4(79.1)

The cacti of Arizona.

Univ. Ariz. Bull. 1940 : $1. **11** : 1–134. 52 pls.

Certain species of cacti, notably the prickly pear, are inimical to human interests, and their eradication is a problem. Others have a purely ornamental value. On the other hand, spineless cacti provide grazing, and a species of *Opuntia* serves as a food plant for the corchineal insect; a number of species have uses, mainly native, as palatable fruits, flower buds, joints or roots, for making preserves and alcoholic beverages, and miscellaneous purposes such as wood and toothpicks. But whatever their significance in practical life, the cacti as a group, with their strange morphological characteristics and often strikingly beautiful flowers, attract attention. This publication provides a manual for the identification of the native cacti in Arizona, i.e. of the following genera, *Opuntia*, *Cereus*, *Echinocereus*, *Echinocactus* and *Mamillaria*. The bulletin, described as semi-popular in nature, does not attempt to discuss taxonomical problems; the species appearing in the keys and described in detail in the text are only those species with a comparatively definite status. Line drawings illustrate the characters important in identification; distribution maps are included. Excellent photographs, some coloured, and a number of paintings of cactus flowers, illustrate most effectively the unique attractiveness of the cactus family.

HOARE, A. H. 635(42)

Vegetable crops for market.

Crosby Lockwood and Son Ltd., London 1945 : 2nd Edition : 12s. 6d. Pp. 188. 34 figs. tables.

Under war conditions fresh vegetable production has rapidly expanded. With peace time conditions this development shows every sign of continuing. In addition, freezing, canning and dehydration are likely to become more important in the future. This book on vegetable production and marketing was first published in 1937. The appearance of the second edition with a revised text to include much of the recent information obtained at the research and experimental stations since 1937, provides the progressive grower with a valuable source of practical knowledge at a critical time in the national economy, when a thorough consideration of peace time possibilities is essential to the individual grower.

An interesting chapter surveys the changes brought about by methods of transport and increasing mechanization of production on systems of production and distribution, and touches upon

the problem of the size of productive units under modern conditions of mechanization. A chapter is included on seeds and plant breeding. Separate chapters are devoted to the *Brassica*, leguminous, root, bulb, salad, early and forced crops, miscellaneous crops (including sweet corn), and culinary leeks. The most suitable varieties for different purposes are indicated, and the importance of high quality seed is stressed. The following appendices are also included: a summary of pests and diseases that attack vegetable crops; grading and packing the principal containers for market produce; and fertilizers for the vegetable grower. The book should do much to encourage the application of sound methods based upon up-to-date knowledge, and to stimulate adaptability in the vegetable growing industry to the needs of the public.

LOCKWOOD, J. F. 664.641.016

Flour milling.

Northern Publishing Co., Ltd., London 1945 (1946) : 2nd Edition : 25s. Pp. 511. 224 figs. tables.

This text-book on flour milling is divided into an introduction and three parts. The introduction gives a simple outline of the whole process; part I deals with those aspects which are preliminary to the actual milling—the properties, sources and testing of wheats, reception conveying, weighing, cleaning, storage, blending, flow control, separation and conditioning. Part II treats of the actual milling while part III deals with the management aspects. The book concludes with twelve appendices, a list of reference works and an index.

The treatment, especially in parts I and II is detailed and authoritative. The author has set himself the object of providing both the student and the practical miller with a complete and up-to-date account of all the processes of flour milling from the reception of the wheat to the despatch of the finished product. Having succeeded in this, he has also provided a useful book for those concerned with wheat as a crop. J. L. F.

NEW JOURNALS

Acta Agriculturae Suecana, Stockholm.

The *Acta Agriculturae Suecana* is a new periodical devoted to the publication of original research in agriculture, and published by the Royal Swedish Academy of Agriculture. The contributions are written in English, French or German, and each volume is issued in three numbers. The first number comprises a paper by H. Nordenskiöld on "Cyto-genetic studies in the genus *Phleum*" (cf. Abst. 1279). The journal is obtainable from the Royal Swedish Academy of Agriculture, Kungl. Lantbruksakademien, Stockholm, price 20 Swedish kronor per volume, postage free.

Agri Hortique Genetica, Landskrona

The Weibullsholm Plant Breeding Institute have undertaken the publication of a journal, *Agri Hortique Genetica*, which contains, mainly, original articles dealing with results of the Institute's work on plant breeding and related problems, with special reference to agricultural and horticultural crop production in Sweden. Results from other sources may also be discussed. The articles are written in Swedish, English and German with adequate abstracts in these languages, as required.

The contents of Vols I–III, reviewed in this issue of *Plant Breeding Abstracts*, deal with the breeding of wheat, poppies and peas; the relation between pod colour and seed production in beans; nitrogen manuring and protein production; genic and plasmatic interspecific barriers; intraspecific and interspecific genes; adventitious buds on roots and the use of this feature the multiplication of perennials; frost resistance; and fungus diseases.

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